

SCIENCE-IX

MODULE - 5

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NATURAL RESOURCES

INTRODUCTION

The materials present in natural environment and useful to living organisms are called **natural resources**. A resource satisfies human wants. Water, air, sunshine, land, soil, forests, wildlife, fishes, minerals and power resources all are useful to man. All basic needs of food, shelter and clothing are supplied by natural resources on earth. Natural resource includes total natural environment, that is the entire surface layer of earth, because all parts of earth's surface are of some use to man in they contribute to the production of necessities and comforts of mankind.

The **word resource** is use for "means of supplying a material generally held in reserve".

NATURAL RESOURCES

Substances used by man in bulk for survival are called resources and since they are found in nature, they are called natural resources.

The resources available on earth include land [Lithosphere], water [Hydrosphere] and Air [Atmosphere].

⇒ Probably, the earth is the only planet on which life exists.

Life exists on earth because it has all the physical conditions necessary for sustaining it. An ambient temperature, water and food are the basic need of all life forms. These basic needs of the life forms are to be met by the resources available on the earth and the energy from the sun.

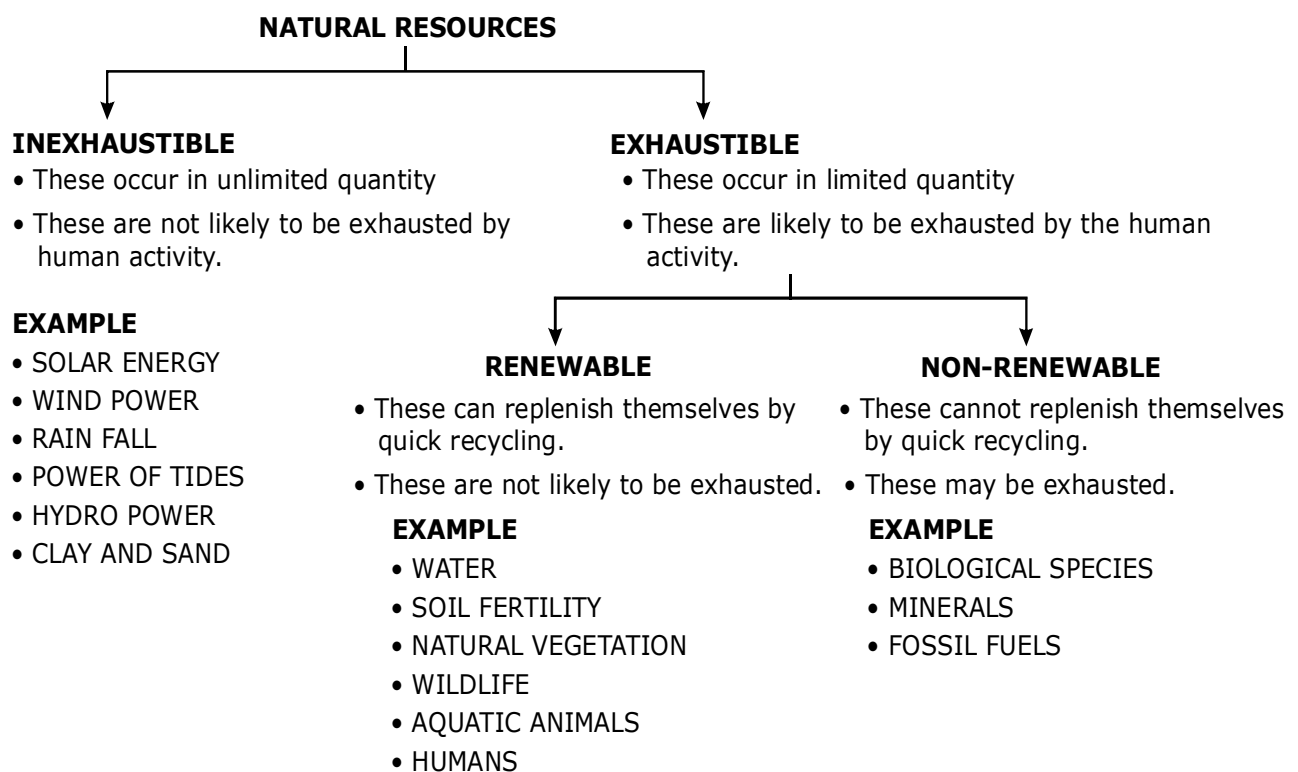
⇒ The outer crust of the earth is called **lithosphere**.

⇒ The water present on the earth's surface and underground constitute **hydrosphere**.

⇒ The air that covers the whole of the earth like a blanket is called **atmosphere**.

⇒ About 75% of the earth's surface is covered with water.

⇒ The life sustaining zone of the earth where the lithosphere, the hydrosphere and the atmosphere interact and make life possible is called the **biosphere**.



DIFFERENCES BETWEEN INEXHAUSTIBLE AND EXHAUSTIBLE RESOURCES

Inexhaustible

1. These resources have no chance of getting exhausted.
2. These resources are unlimited e.g. wind energy, solar energy, hydropower, tidal energy etc.

Exhaustible

1. These resources have every chance of getting exhausted.
2. These resources are limited, e.g. coal, petroleum, forests etc.

DIFFERENCES BETWEEN RENEWABLE AND NON-RENEWABLE RESOURCES

Renewable resources

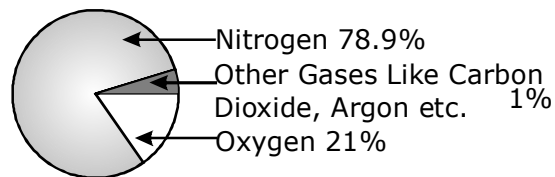
1. Exhaustible resources which can be regenerated or recycled within reasonable time.
2. Can be made to last indefinitely if used judiciously.
3. Availability can be enhanced by increasing their capability of regeneration
Examples : Ground water, Wildlife, Grasslands, Forests & Soil fertility

Non-renewable resources

1. Exhaustible resources which cannot be regenerated or recycled in reasonable time.
2. Will get exhausted whether or not used judiciously.
3. Availability can be enhanced by increased extraction but it will cause early depletion
Examples : Minerals, Fossil fuels like coal and petroleum.

THE BREATH OF LIFE : AIR

- ⇒ Air is a mixture of many gases like nitrogen, oxygen, carbon dioxide, water vapour and some others present in the atmosphere.
- ⇒ Air is an important inexhaustible natural resource.
- ⇒ Nitrogen and oxygen are the major components of the air.



N_2 – 78.9% O_2 – 21% Other gases – 1%

Venus and Mars – $CO_2 \rightarrow 95-97\%$ of the atmosphere. That's why no life on these planets.
 CO_2 in Earth atmosphere – 0.03%

- Small amount of water vapours, dust, salts, smoke is also found.

IMPORTANCE OF AIR/ATMOSPHERE

- ⇒ It is essential for the survival of life. It supplies oxygen for respiration of all living organisms and carbon dioxide for the photosynthesis in green plants.
- ⇒ Air (oxygen) is essential for burning and making fire.
- ⇒ Air acts as a medium for locomotion of flying animals : insects, birds, bats etc.
- ⇒ Air maintains the temperature of the earth.
- ⇒ Air helps in the dispersal of spores, pollen grains, seeds and fruits.

THE ROLE OF THE ATMOSPHERE IN THE CLIMATE CONTROL

- ⇒ The atmosphere covers the earth like blanket.
- ⇒ Since, the air is a bad-conductor of heat, the atmosphere keeps the average temperature of the earth fairly constant during the day and also during the course of the whole year.
- ⇒ The atmosphere acts as a buffer.
- ⇒ The day and night temperatures show a great difference where atmosphere is absent.
Moon \rightarrow temperature range $\rightarrow -190^\circ C$ to $110^\circ C$.



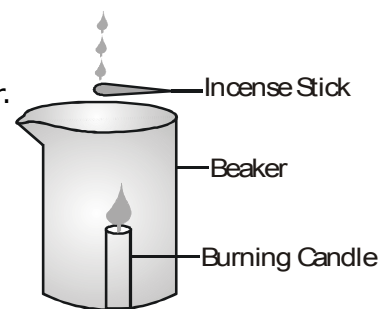
ACTIVITY ZONE 3.1

To show the possible directions in which hot and cold air move.

- Take a candle. Fix it in a beaker and light it as in figure.
- Take one incense stick. Light it and bring it to the mouth of beaker.

Note the result with following actions :

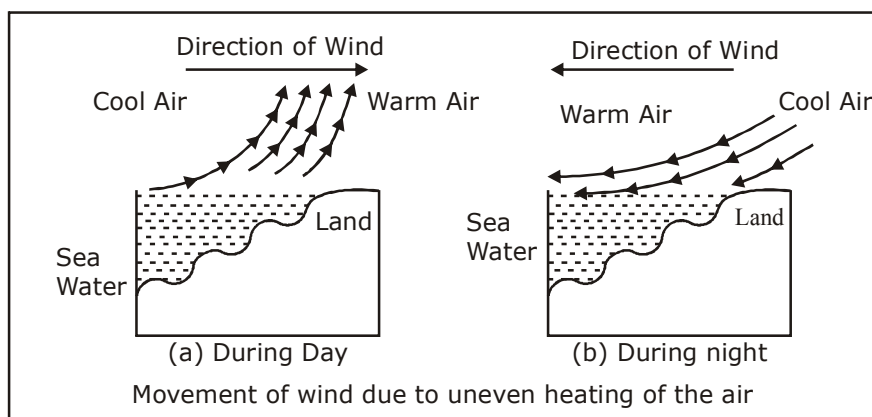
- Which way smoke flows, when incense stick is brought near the margin of beaker's mouth ?
- Tell the direction of smoke when incense stick is brought little above the burning candle.
- Which way smoke flows when incense stick is taken to other areas Give the possible reasons.



Air currents being caused due to beating of air

MOVEMENT OF AIR IN COASTAL REGIONS

- ⇒ In coastal regions, the air above the land gets heated faster than the air over the sea.
- ⇒ The heated air over the land rises up and creates a region of low pressure.
- ⇒ The movement of air from one region to the other creates winds. Thus, **the direction of the wind would be from the sea to the land during the day time.**
- ⇒ After the sunset, both land and sea start to cool. The water cools slower than the land. Consequently, the air above water would be warmer than the air above the land. This, **would cause blowing of winds from land to the sea.**



AIR POLLUTION

The present day industrial growth has polluted air to a greater extent by releasing SO_2 , CO_2 , CO, oxides of nitrogen, H_2S fumes of acids, dust particles of unburnt carbon, lead asbestos and even cement. For example, the burning of coal and oil to generate electric power, run factories and fuel automobile engines creates oxides of nitrogen and sulphur that acidify the rain.

Air carries many undesirable substances or impurities which are not good for our health. The chief constituents of the impurities of air include (i) carbon dioxide, (ii) carbon monoxide, (iii) oxides of sulphur, (iv) oxides of nitrogen, (v) fluoride compounds, (vi) metals (e.g. lead nickel, arsenic, cadmium, tin etc.) (vii) hydrocarbons (e.g., benzene), (viii) particulate matter (dust, grit, fly ash) and (ix) toxicants. All these impurities are called **pollutants**. They cause air pollution.

Definition : *The presence of harmful gases and suspended particles in the air which have adverse effect on human beings, animals and vegetation is called air pollution.*

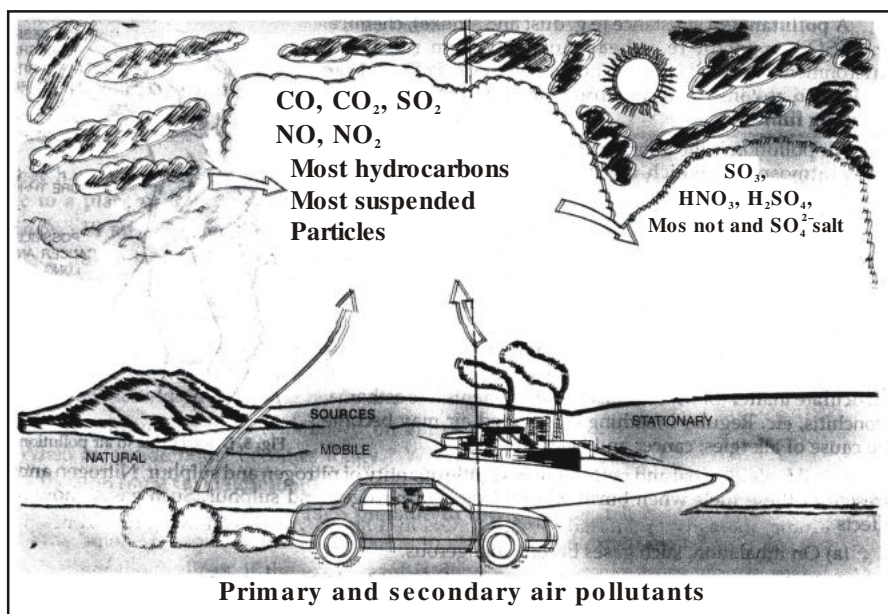


CONSEQUENCES OF AIR POLLUTION

Air pollutants can cause respiratory problems, renal problems, high blood pressure, problems in nervous system, eye irritation etc. in the human beings. Many injurious effects such as falling of leaves, reduced growth, degeneration of chlorophyll etc. have been reported in plants. **Lichens** are found to be very sensitive to the levels of contaminants such as sulphur dioxide present in polluted air.

PRIMARY POLLUTANTS

SECONDARY POLLUTANTS



ACID RAIN

Literally acid rain means the presence of excessive acid in rain water : Acid rain is infact cocktail of mainly H_2SO_4 and HNO_3 .

H_2SO_4 is the major contributor (60–70%) to acid precipitation HNO_3 ranks second (30–40%) and HCl third.

CAUSES OF AIR POLLUTION

- (i) Increase in human population and rapid industrialization.
- (ii) Burning of fossil fuels.
- (iii) Oxides of nitrogen and sulphur inhalation adversely affect human health and also causing acid rains.
- (iv) During cold weather water vapour get condensed on the suspended particle [Unburnt carbon particles and hydrocarbons] resulting in smog formation.

POINTS TO BE REMEMBER

- ☞ Fossil fuels considered as non-renewable resources because it takes millions of the year for recycle.
- ☞ Differential heating of earth surface [water & land] causes the wind.
- ☞ Air is a bad conductor of heat, therefore atmosphere maintains the average temperature of the earth. The atmosphere prevents sudden increase in temperature during day time and during night, it prevents the escape of heat into outer space.
- ☞ The envelope of air that surrounds our planet earth is called atmosphere. Different layers of atmosphere are :-
 - (a) Troposphere (b) Stratosphere (c) Mesosphere (d) Thermosphere
- ☞ Air is inexhaustible natural resource. It is a mixture of gases such as nitrogen, Oxygen and Carbon dioxide. It also holds water vapours & dust particles. It is essential for life.
- ☞ World Environment day - 5th June : It was established by UN General Assembly in 1972.



Q.1 How is our atmosphere different from the atmosphere on Venus and Mars ?

Ans. On the planets Venus and Mars carbon dioxide forms the major component constituting upto 95-97% of the atmosphere. No life is known to exist there. On the contrary, on the Earth, air forms the blanket around the Earth having nitrogen (78.08%), oxygen (20.92%), carbon dioxide (0.03%), argon (0.93%) and trace components (0.04%). It has life on it.

Q.2 What causes winds ?

Ans. The movement of air from one region to another creates winds. When the solar radiations fall on the Earth, some are absorbed and majority of these are reflected back or reradiated by the land and water bodies. These reflected or reradiated solar radiations heat up the atmosphere from below. As a result, convection currents are set up in the air. But since land gets heated faster than the water, the air above the land gets heated faster than the air over water bodies. During the day, the air above the land gets heated faster and starts risings, creating a region of low pressure below. As a result, the air over the sea moves into this region of low pressure and forms the wind.

REVIEW QUESTIONS

Give answer of following questions

1. What are the basic needs of life to exists ?
2. How is our atmosphere different from the atmospheres on Venus and mars ?
3. What is biosphere ?
4. What causes winds ?
5. How clouds are formed ?
6. Name any three human activities that causes air pollution.
7. What are the effects of air pollution on human health ?
8. Give the definition of Resources.
9. Give the definition of air pollution.

Fill in the blanks

1. Natural resources are air and
2. Water covers about percent of the earth.
3. Nitrogen form percent part of air where as oxygen form percent part of air.
4. Carbon dioxide constitutes of the atmosphere of venous planet.
5. During day time air moves from to

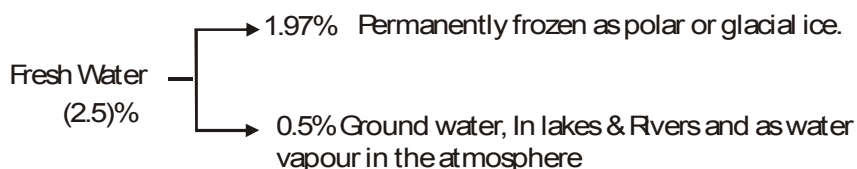
WATER : A WONDER LIQUID

Water is a basic human need.

About 3/4 of the earth surface is occupied by water.

Most of the water on earth's surface (about 97.5%) is found in seas and oceans. It is strongly alkaline.

The rest (2.5%) is fresh water.



Importance of water to the living organisms - No life can exist without water because of :-

- (i) All cellular processes take place in a water medium.
- (ii) Water is essential for the process of digestion.
- (iii) Water helps in maintaining body temperature.
- (iv) All the biochemical reactions that take place within our body and within the cells occur between the substances that are dissolved in water.
- (v) Substances are also transported from one part of the body to the other in dissolved form. Hence, organisms need to maintain the level of water within their bodies in order to stay alive.
- (vi) Water is also required for cooking, cleaning, irrigation, in industries and generating electricity. Terrestrial life-forms require fresh water because their bodies cannot tolerate or get rid of the high amounts of dissolved salts in saline water. Therefore, water sources must be easily accessible for animals and plants to survive on land.

WATER POLLUTION

The addition of undesirable substances or removal of desirable substances in/from the water bodies are a change in the temperature of water, which degrades the quality of water so that it either becomes health hazard or unfit for use is called water pollution.

TYPES OF WATER POLLUTANTS

(1) Physical water pollutants

These include heat and oil-spills. Specific industries and thermal / nuclear power plants use water for cooling in various operations and later return this hot water to water bodies. This results in **thermal pollution**. Another manner in which the temperature of the water in river can be affected is when water is released from dams. The water inside the deep reservoir would be colder than the water at the surface which gets heated by the sun. High temperature of water reduces its dissolved oxygen content.

(2) Chemical water pollutants

These include organic wastes e.g. sewage, detergents, fertilizers, pesticides (e.g. dieldrin, DDT, DDE, BHC, etc.), [polychlorinated biphenyls [PCBs], inorganic chemicals (e.g. arsenic, cadmium, mercury, lead, phosphates, nitrates, fluorides etc.)] and radioactive wastes. Common inorganic impurities in water are compounds of calcium and magnesium.

(3) Biological water pollutants

These include pathogens such as viruses, bacteria, protozoa, fungi, helminths & nematodes etc.

POINT AND NON-POINT SOURCES OF WATER POLLUTION

(1) Point sources

These sources have a specific location for the discharge of water pollutants directly into water bodies. Therefore, these sources are located near the water bodies i.e. factories, power plants, breweries, underground coal mines and oil wells. It is always easy to treat the pollution coming out of point sources before their discharge into water bodies.

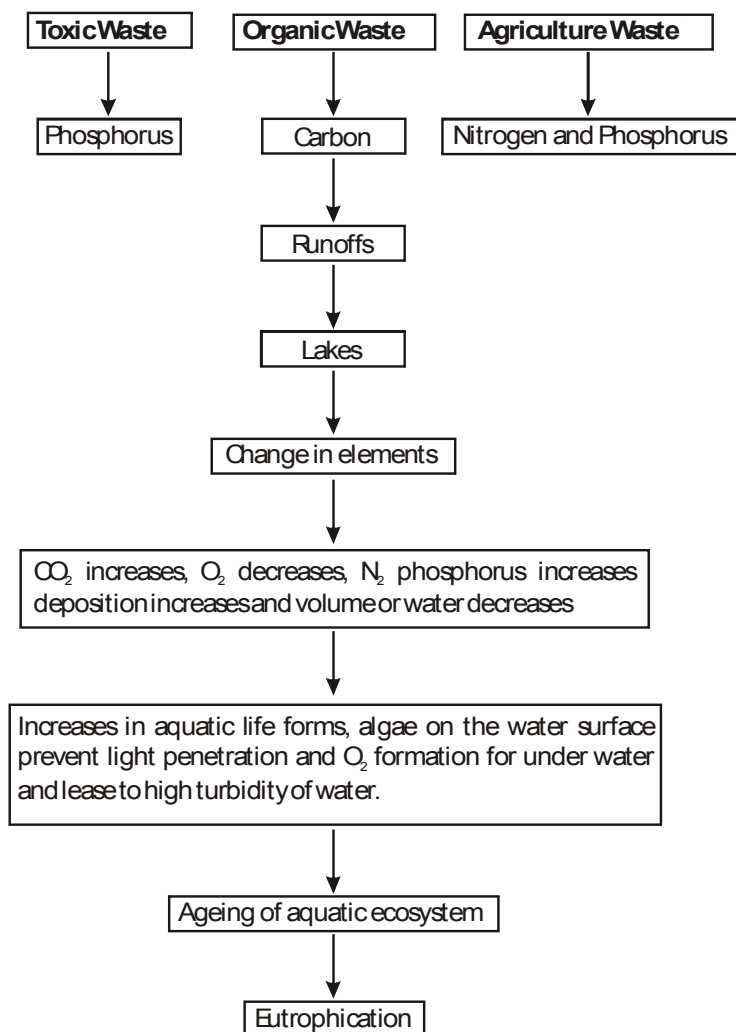
(2) Non-point sources

These pollution sources are scattered and do not have any specific location for discharging pollutants into particular water bodies. Example of non-point sources are run-off from fields, lawns and gardens, road and streets, construction sites, logging areas etc. Unlike point sources, these sources are difficult to monitor and treat to remove the pollutants.

The term water pollution is used to cover the following effects in water :-

- (i) Addition of undesirable substances to water bodies.
Like fertilizers and pesticides used in agriculture or poisonous substances
- (ii) Removal of desirable substances from water bodies. i.e. dissolved oxygen.
- (iii) Change in temperature.





Eutrophication :- Eutrophication is the process in which dissolved oxygen in water is reduced due to excessive growth of algae as a result of extra loading of nutrients in the water body. In fact, presence of sewage and fertilizers (nitrates and phosphates) in polluted water provide a lot of nutrients to the algae (phytoplankton) present in water body. As a result, excessive growth of algae occurs which is termed **algal bloom**. The algae subsequently die and aerobic decomposers become active. They consume rapidly the dissolved oxygen of the water during decomposition of the dead algae. In the absence of dissolved oxygen, all the aquatic life (including fishes) in the water body dies. Thus, eutrophication deprives us of one of our significant sources of food.

Biomagnification (bioaccumulation) :- Pesticides such as DDT, DDE, dieldrin, etc. are harmful chemicals that are regularly being used in agriculture to protect crops from the pests (fungi, insects, etc.). Also heavy metals (e.g. mercury, cadmium, tin, lead, arsenic, etc.) are regularly poured from industries into the water bodies. These chemicals are non-biodegradable, i.e. unlike the organic sewage wastes they are not broken down by the activity of microorganism. These pesticides / heavy metals, therefore, enter the soil or washed out by run off water to surface water bodies such as lakes, streams, rivers. From soil or water these pesticides / heavy metals then enter the food chain via the producers. At each trophic level, their concentration goes on increasing. This phenomenon of increase in concentration of harmful non-biodegradable chemical substances in the body of living organisms at each trophic level of the food chain is called **bioaccumulation, biological accumulation or biomagnification**. This makes it more likely that predators such as fish-eating birds such as kingfishers become poisoned. For example, biomagnification of mercury in the fishes through a food chain results in **Minimata disease** in fish-eating human populations of the regions.



SOIL

Definition :- Soil is a portion of earth's a surface consisting of disintegrated rock and decaying organic material. It provides the support for many plants and animals. Thickness of soil on the earth's surface ranges from a few millimeters to 3–4 meters. Terrestrial plants depends for their nutrients, water supply and anchorage upon the soil. Even for the aquatic plants, the solid is important as chief storage of all the nutrients which are made available to the water medium.

Mineral Riches in the soil :

Our planet earth has three distinct regions **innermost core** region (about 2200 miles in thickness), **middle mantle region** (about 1800 miles in thickness) and the **outermost crust** region (about 20–25 miles in thickness). The outermost crust region has huge rocks containing variety of bound minerals, some of which become available to us.

About one-fifth of the surface of the earth is exposed solid and distinct from oceans, lakes etc. It is called the **land. The top surface layer of this exposed, solid part of crust capable of supporting plant growth is called soil.** Over millions of years of long periods of time, the rocks at or near the surface of the earth are broken down by various physical, chemical and some biological processes to form fine soil particles. Soil is a dynamic layer in which many complex physical, chemical and biological activities are going on constantly. It is an important resource that decides the diversity of life in an area.

The soil is a complex mixture. It consists of five components :

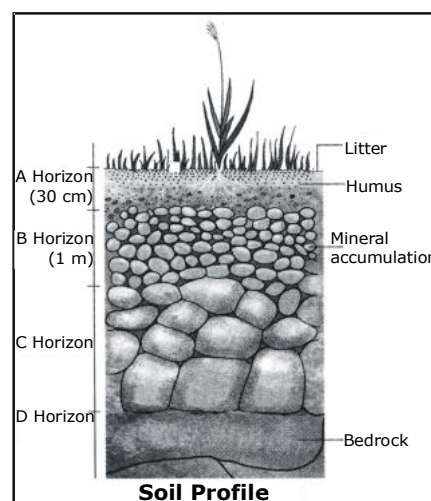
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|--------------------------|--------------------------|
| (i) Mineral matter = 45% | (ii) Organic matter = 5% |
| (iii) Water = 25% | (iv) Air = 25% |
| (v) Living organisms. | |

All these components are essential for proper plant growth. Their percentage is given figure.

Soil profile :

Soil profile shows four distinct layers, called **horizons**.

Horizon A is the topsoil. It is darker and of a looser texture than the underlying horizon B. Plant and animal matter collects at the surface of this horizon, forming the litter. Below the litter is the **humus**, i.e., organic matter undergoing decay by microbial action. The rest of horizon is rich in organic and mineral contents. The **horizon B** has soil particles smaller and usually more compacted than in the horizon C. Minerals brought by rain water from the upper horizon accumulate in this horizon. The **horizon C** consists of the weathered material derived from the intact parent rock. The parent rock forms the horizon D.



Humus is partially decayed organic matter. It makes the soil porous, thereby increasing its air and water holding capacity. Humus is rich in nutrients that promote plant growth. Being black, it absorbs heat to warm up the soil.



COMPOSITION OF TOP SOIL

Soil particles differ in their size, look and texture. Mainly four types of soil particles are commonly found in top soil. These are :

- (i) **Gravels :-** These are large particles having size of greater than 2 mm in diameter. These can be easily picked up by hands.
- (ii) **Sand particles :-** These are still smaller in size ranging between 0.005 mm to 2 mm. These are rough to touch and can be seen with naked eye.
- (iii) **Silt particles :-** These are still smaller in size ranging between 0.005 mm to 0.05 mm in diameter.
- (iv) **Clay particles :-** These are the smallest soil particles having size less than 0.005 mm.

TYPES OF SOILS

Depending upon the presence of relative amounts of soil particles, soils are classified into following three types:

1. **Sandy soil :-** It contains very large proportion of sand particles and very small quantity of silt and clay. Since sand particles are relatively larger in size, this soil can not hold much water. It is found in deserts and is unfit for plant growth.
2. **Clayey soil :-** It contains large proportion of clay particles (40% or more) and small amounts of humus and silt. Clayey soil, being compact, can hold water. However, it is poorly aerated as it can not trap air. It is also not suitable for plant growth.
3. **Loamy soil :-** Loamy soil contains relatively larger quantities of clay, silt, sand particles and humus. In fact, it contains about one part clay, two parts silt and two parts sand.

Therefore, it is porous has very good water holding capacity and also allows aeration of roots.

MAJOR TYPES OF SOILS IN INDIA

The soil is classified on the basis of its composition and nature. The major types of soils found in our country and their composition are presented in table.

Major types of soils found in India and their compositions		
S. No.	Types of Soil	Composition
1	Black soil	Main constituent is clay.
2	Red soil	Sandy loam soil.
3	Desert soil	Sandy soil, poor in organic carbon.
4	Mountain soil	Gravel and sandy soil.
5	Alluvial soil	Loamy, clay soil.
6	Laterite soil	Porous clay soil rich in iron and aluminium hydroxides.

SOIL POLLUTION

The contamination of soil (or land) with solid waste, chemicals (through industrial wastes or acid rain), fertilizers and pesticides, reducing its fertility is called soil pollution (or land pollution).

Soil pollution : Soil pollution can be defined as decrease in soil fertility because of addition of some foreign elements. Soil is polluted with dumping of solid wastes generated in house hold and manufacturing units. Domestic wastes include kitchen garbage, broken bottles, cloth rags, ash, etc. Industrial wastes include fly ash, metal scraps, dyes, plastics, etc. **Agricultural** chemical and fertilizers are also the cause of land pollution. The dumping of human excreta and waste from cow-sheds and slaughter houses befouls the land. Most important causative pollutant of soil is **plastics**.



SOURCE OF SOIL POLLUTION

The main sources of soil pollution include :

1. **Solid wastes**
2. **Chemical** (directly through **industrial wastes** or indirectly through acid rain)
3. **Excess of fertilizers and pesticides**

1. **Solid wastes :-** These are considered the main source of soil pollution. Solid waste generally comes from residences, cattle sheds, industries, agricultural fields, and many other places. It includes peelings of fruits and vegetables, cow dung, human excreta, ash, paper, glass, plastics, leather and rubber articles, brick, sand worn out clothes, and metal objects. These heaps of solid waste make the surroundings dirty, and pollute the soil.
2. **Chemicals :-** Industrial wastes are generally dumped in vacant sites along the roads, railway tracks or elsewhere. These industrial wastes contain a lot of chemicals that pollute the soil. Chemicals discharged into the air in the form of fumes such as compounds of sulphur and lead, as well as gases (e.g., SO_2 and NO_x) eventually come down and settle as dry deposition or as acid rain on the soil and pollute it.
3. **Excess of fertilizers and pesticides :-** Fertilizers are used in the agricultural fields to increase the crop production. Also, different kinds of chemicals (pesticides) are sprayed on the crops to kill the pests, weeds, etc. All these chemicals, when used in excess, get mixed with soil and pollute it. From the soil, many non-biodegradable chemicals (e.g. DDT) even enter the food chains and biomagnify.

EFFECTS OF SOIL POLLUTION

1. The industrial pollutants increase the toxicity levels of the soil.
2. Soil pollution due to **domestic sewage** may cause diseases like giardiasis, tetanus, etc. in human beings.
3. Land pollution may also cause several plant diseases.
4. Weedicides act as **metabolic inhibitors** or reduce the plant yield.
5. Mine dust causes many types of deformities in animals and human beings. It also destroys the vegetation of that area.
6. Excess of fluorides in land cause fluorosis.

SOIL EROSION

Soil is a complex mixture of non-living materials and living organisms. It provides anchorage (firm support) to plants, and is also a source of nutrients and water to the plants. Majority of the plants, thus, grow in the soil. The top layer of soil (commonly called top soil) is very fertile. It is often carried away by environmental agencies i.e., strong winds and fast flowing water.

CAZRI : is actively engaged in research to suggest measures for controlling wind erosion.

The removal and transportation of top layer of soil from its original position to another place with the help of certain agents such as strong winds and fast running rain water, is called soil erosion. Soil erosion normally occurs in bare areas i.e. areas without plant cover. It is so because the bare top-soil is loose and thus can easily be carried away by strong winds or fast moving water of heavy rains or rivers.

CAUSES OF SOIL EROSION

1. Strong winds
2. Heavy rains
3. Improper farming and suspended cultivation
4. Human actions
5. Dust storms



EFFECTS OF SOIL EROSION

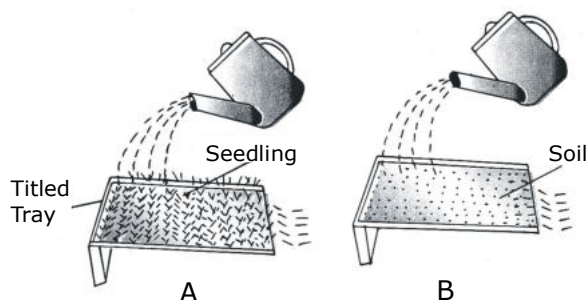
1. Loss of fertility and desertification
2. Landslides in hilly areas
3. Flash floods
4. Famines

PREVENTION OF SOIL EROSION

1. Intensive cropping
2. Sowing grasses and planting xerophytes
3. Terrace farming
4. Proper drainage canals around the field
5. Making strong embankments along the river banks

ACTIVITY ZONE 3.2**To show the effect of vegetative cover on ground and soil erosion.**

- Take two trays 'A', 'B' of same size and fill them with soil.
- Plant seeds of gram or paddy in tray 'A'.
- Regular pour water in both the trays.
- Seedlings will appear in tray 'A' and shows coverage of plant growth.
- Place both the trays at tilted position.
- Pour equal amount of water in both the trays.
- Observe the amount of soil emitted out of trays.
- Repeat the process 3–5 times.
- Now find out the quantity of soil, carried out of trays.

**Effect of vegetative cover on soil and soil erosion****Now answer the following :**

- (i) How much soil is carried out of trays i.e. 'A' and 'B' ?
 (a) When water is poured gently ?

Q.1 How is soil formed ?

Ans. Soil is a mixture of small particles of rocks and humus (i.e., organic matter obtained from decaying of living organisms or their wastes). Temperature variations due to radiations of the sun, rain water, winds and living organisms influence the formation of soil from the rocks involving two processes ; weathering and paedogenesis.

Breakdown of bigger rocks into small, fine soil particles is called **weathering**. It may occur due to physical, chemical or biological means. Under the influence of solar radiations, rocks heat up and expand. At night, these rocks cool down and contract. Since all the parts of rocks do not expand and contract at the same rate, cracks appear in the rocks and ultimately the large rocks breakdown into smaller pieces. Flow of water through or over the rocks make the cracks bigger. Flowing / falling water also has an erasing effect on the rocks. On freezing the water expands in rock crevices and break the rocks. Similarly, strong winds continue to rub against hard rocks and erode them. Growth of lichens, mosses and other plants also influence the formation of soil by eroding the rocks over which they are growing.



Paedogenesis involves the decomposition of organic materials by bacteria and fungi and humification and mineralization of decomposed organic matter. Earthworms also play an important role in the soil formation.

Q.2 Why is the atmosphere essential for life ?

Ans. The multilayered gaseous envelope (or blanket) surrounding the planet Earth is called atmosphere. Atmosphere filters sunlight reaching the Earth affect climate and is a reservoir of several elements which are essential for life. Oxygen is required by most living beings for respiration and for burning (combustion) of materials. Air contains about 21% oxygen and its percentage in air is balanced by the process of photosynthesis. Photosynthesis occurs in chloroplasts of green plants and this metabolic activity requires CO_2 , water and sunlight but release oxygen gas. Ozone umbrella of atmosphere does not allow penetration of ultraviolet light of solar radiations to reach the Earth. These solar radiations otherwise affect organisms adversely (e.g., UV rays may cause skin cancer in human beings).

BIO-GEOCHEMICAL CYCLE

Both non-living (abiotic) and living (biotic) components of the biosphere constantly interact with each other to form a dynamic, but stable system. The intersection include transfer of matter and energy between the different components of the biosphere.

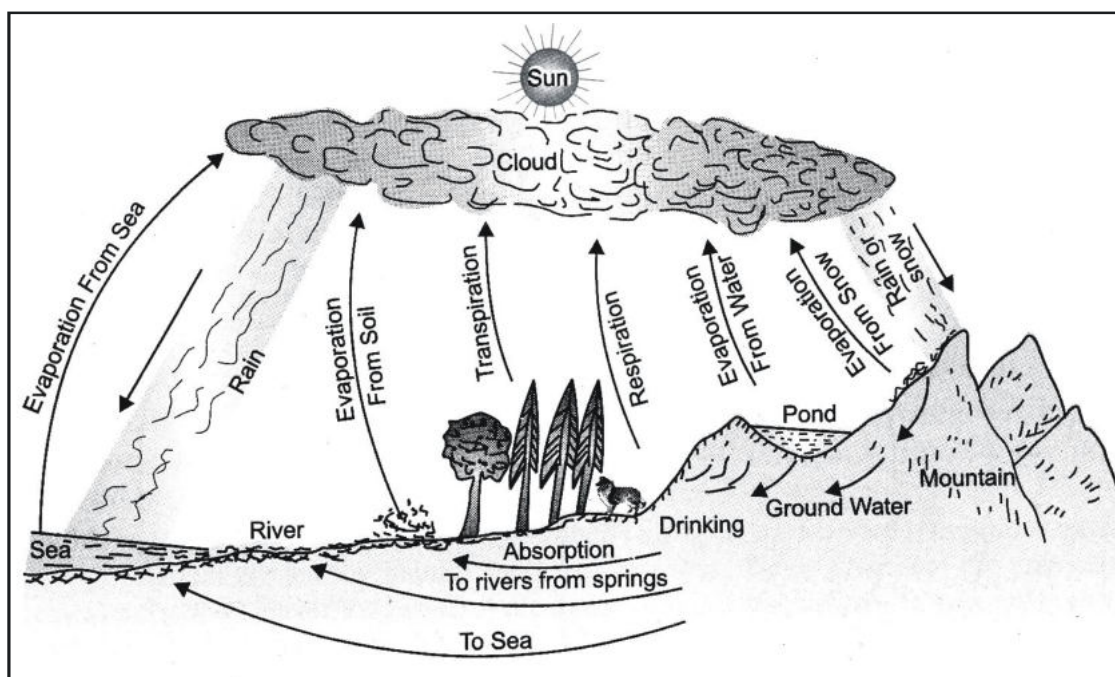
As far as nutrients are concerned, all living organisms require eight elements as nutrients in relatively larger amounts. These include carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, potassium and calcium. The living organisms get the nutrient elements from lithosphere (mainly soil), hydrosphere and atmosphere.

Bio-refers to living, geo-refers to the rocks, soil, air and water of the earth.

The cyclic flow of elements or compounds between non-living environment [Soil, rock, air, water] and living organisms is known as 'bio-geochemical cycle'.

Water, oxygen, carbon and nitrogen cycles are very important in maintaining the balance in our environment

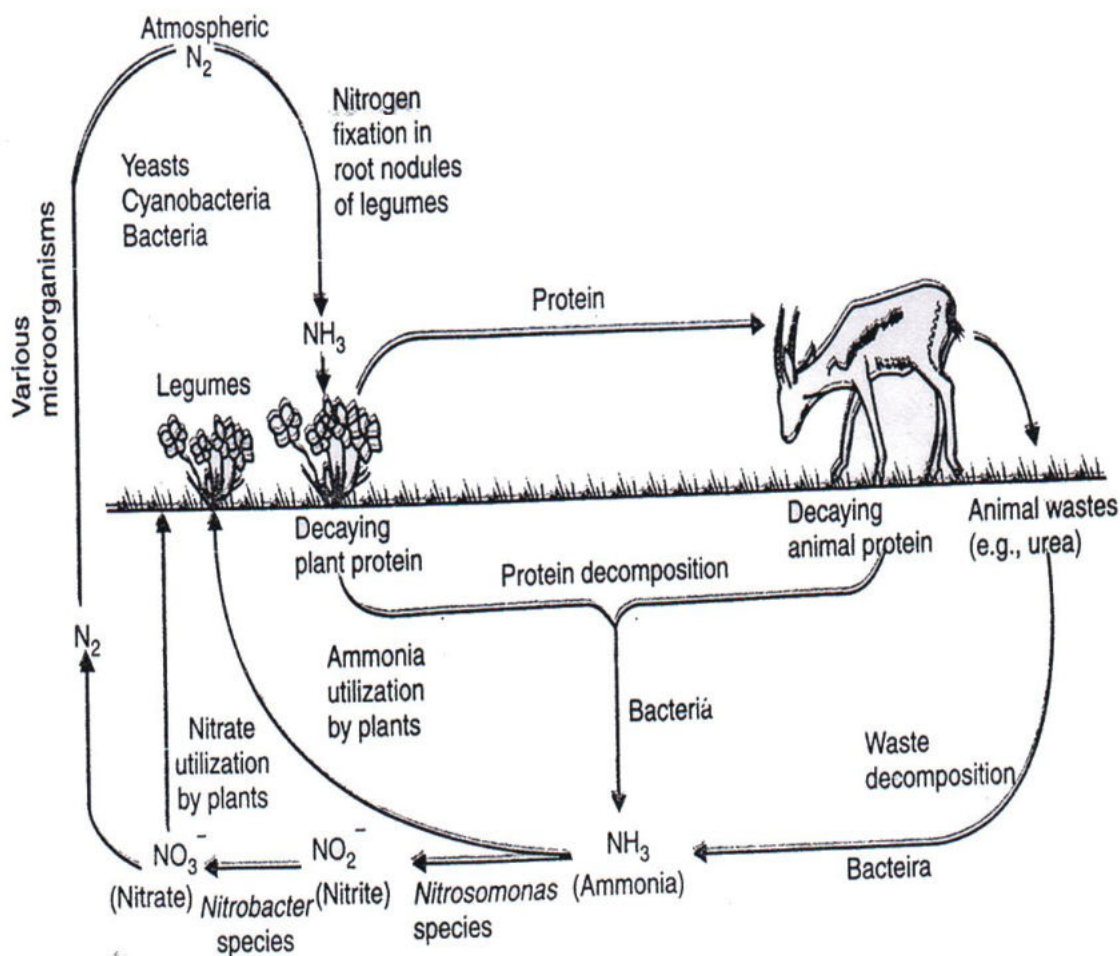
1. WATER CYCLE



- (i) Water is a compound and include two vital elements **hydrogen** and **oxygen**. It forms a very important component of the environment and survival of all living organisms depend on it.
- (ii) Ocean is the biggest store house of water which on evaporation form clouds and which after condensation fall down as rain or snow.
- (iii) After rain it passes through puddles, ponds and rivers and get collected again in the ocean. The circulation of water in this manner is known as **hydrologic cycle or water cycle**. This cycle is driven by solar power and also performed through living organisms such as absorption and transpiration of water by plants and drinking by animals. The formation of soil, too depend on water.

2. NITROGEN CYCLE

- (i) Nitrogen is an important chemical on the earth and present in all the living organisms in the form of protein, amino acids and nucleic acid.
- (ii) In atmosphere it exists in molecular form (N_2) and in form of some oxides [N_2O , NO , NO_2 , NO_3^-]. Nitrogen is the most abundant component of air (78 percent). Atmospheric nitrogen directly cannot be used by living organisms.
- (iii) During lightning nitrogen of atmosphere reacts with oxygen and ultimately form dilute nitric acid. This acid comes down to earth with rainwater. Nitrates are absorbed by plants and utilized for making organic matter (proteins), etc.
- (iv) When animals consume plant matter, they break down the plant's nitrogenous compounds and use them to form new animal proteins and other cell components.



Nitrogen cycle



BIOLOGICAL NITROGEN FIXATION

Nitrogen fixation [conversion of atmospheric nitrogen gas into N_2 -compounds]

(i) *Rhizobium* [in root nodules of leguminous plants]

(ii) *Azotobacter* [in soil]

(iii) Blue Green Algae

Ammonification [conversion of nitrogen containing proteins of dead plants and animals into ammonia]

(i) Putrefying bacteria

(ii) Fungi

Nitrification [conversion of ammonia into nitrites and then into nitrates]

(i) Nitrosomonas bacteria - Convert NH_3 into nitrites (NO_2^\ominus)

(ii) Nitrobacter bacteria - Convert nitrites into nitrates (NO_3^\ominus)

Denitrification [Conversion of nitrate salts into free nitrogen gas]

e.g. *Pseudomonas*.

OXYGEN CYCLE

Importance of Oxygen :- Oxygen is also an essential component of biomolecules. It is needed for respiration also.

Main sources :- Oxygen is available in molecular form (O_2) in the air, forming about 21% of it. Some oxygen is found dissolved in water. Oxygen also occurs as a component of water and carbon dioxide.

Use and Release :- The oxygen of the atmosphere is in a state of dynamic equilibrium. It is taken by animals and plants from the air or as dissolved in water for use in oxidative reactions (respiration). It is returned to the environment, either in combination with carbon as carbon dioxide or with hydrogen as water. The carbon dioxide and water are used by plants in photosynthesis, which liberates molecular oxygen into the environment for reuse in respiration. Thus, the cycle is completed.

The concentrations of oxygen in the air and water are maintained by equal rates of its use in respiration and release in photosynthesis.

Oxygen is also released as a part of CO_2 by decay of dead organic matter.

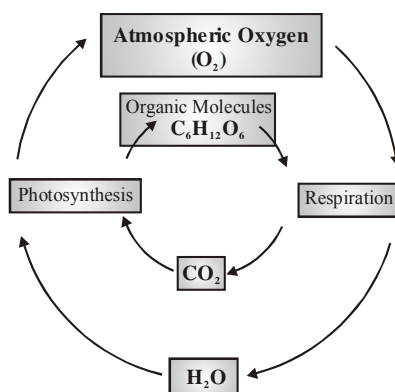
Some oxygen is added to the air as CO_2 , H_2O , sulphur dioxide and nitrogen oxides during burning of fuel (wood, coal, petroleum and natural gas).

Some oxides are formed by microbial oxidation. These oxides release O_2 when reduced by chemical and biological processes.

Effect of Human Activity :- Oxygen was not present when the earth was formed. It was added to the atmosphere later when photosynthesis started with the evolution of photoautotrophs. Human activity has not affected the oxygen content of the atmosphere because it is replenished by photosynthesis.

Oxygen is essential element required for respiration. It forms about 21% of the air in the atmosphere.





CARBON CYCLE

The cyclic flow of carbon between non-living environment and living organisms of biosphere is called carbon cycle in nature.

In abiotic environment, carbon is present in the following forms :

- as carbon dioxide in the air or atmosphere.
- as dissolved carbon dioxide or carbonic acid and bicarbonates in water bodies or hydrosphere.
- as fossil fuels, like coal, petroleum and natural gas, and
- as carbonates and graphite in rocks.

In biotic environment, Carbon forms the backbone of complex organic molecules like carbohydrates, lipids, proteins, nucleic acids, enzymes, hormones etc.

The availability of carbon in the environment is, therefore, a crucial factor in the maintenance of living beings. It is essential that the carbon 'locked up' within the organisms be returned to the environment for reuse.

Then main reservoir of carbon is the atmosphere.

Processes by which carbon dioxide of atmosphere is consumed :-

The plants use carbon dioxide as one of the raw materials for the process of photosynthesis and prepare carbohydrates.

When animals feed on the plant products, plant carbohydrates change into animal carbohydrates.

Some of the dead plants and animals get buried deep under the earth and change into fossil fuels (coal and petroleum) through slow chemical change.

Some of the dissolved carbon dioxide in oceans and other water bodies gets converted into limestone and other carbonate rocks.

Processes by which carbon is released from biotic world to abiotic world

Both plants and animals release carbon dioxide in the atmosphere as a product of respiration.

When plants and animals die, their bodies are decomposed by decomposers and carbon dioxide is released into the atmosphere.

Combustion of fossil fuels like coal, petroleum gas, kerosene, petrol, diesel, etc gives carbon dioxide which goes into atmosphere.

Weathering of carbonate rocks by the action of micro organisms or when acid rain falls on these rocks liberates carbon dioxide.

Volcanic eruptions and hot springs also release carbon dioxide into the atmosphere.

Thus, there is continuous exchange of carbon dioxide between living and non-living world.



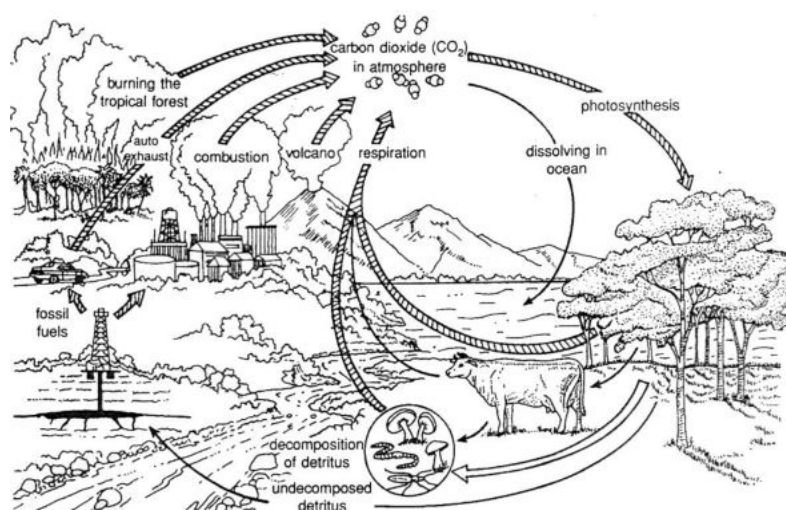
Greenhouse effect :

In greenhouse, the heat is trapped by glass, hence the temperature in a glass enclosure is much higher than the surroundings. Due to higher temperature in glasshouses, the tropical plants can be kept warm and protected from cold temperature during winter.

Some gases, like carbon dioxide, methane and nitrous oxides also prevent the escape of heat from the earth. With industrialization, widespread deforestation and burning of more fossil fuels, the concentration of carbon dioxide in the air is increasing with an alarming rate. Carbon dioxide gas traps heat within the atmosphere preventing its escape into the space.

Therefore increased CO_2 concentration in air is the major cause of rise in atmospheric temperature. It causes melting of polar ice. It also causes submerging of coastal land under water.

CFC is the major compound responsible for ozone depletion.



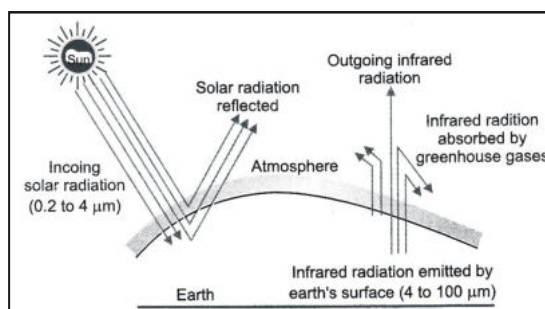
Green house effect and global warming :-

Earth temperature is maintained by re-radiated infrared (heat) radiation by greenhouse gases which prevent heat from escaping to outer space. This is comparable to glass panels of a greenhouse which keep CO_2 concentration higher and so higher temperature inside i.e. greenhouse. This effect is called **greenhouse effect**.

Green house gases - CO_2 , CH_4 , NO_x . They prevent the escape of heat from the earth.

Increased CO_2 concentration in air is the major cause of rise in atmospheric temperature. It causes melting of polar ice. It also causes submerging of coastal land under water.

Due to higher temperature in glasshouses, the tropical plants can be kept warm and protected from cold temperature during winter.



DEPLETION OF OZONE LAYER

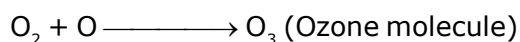
Ozone Gas :

Ozone is poisonous in nature.

- ◆ Ozone is formed in atmosphere by the action of ultraviolet radiation on oxygen gas.
- ◆ The high energy ultraviolet radiation (UV radiation) coming from the sun splits oxygen gas into free oxygen atoms



- ◆ The free oxygen atoms are highly reactive. One oxygen atom reacts with an oxygen molecule to form an ozone molecule.



- ◆ **Ozone Layer :** It is a layer of the earth's atmosphere where ozone is concentrated. The Ozone layer is very important for the existence of life on earth because it absorbs most of the harmful ultraviolet radiation coming from the sun and prevents them from reaching the earth.

The thinning of ozone layer is commonly called ozone depletion. Ozone is being depleted by air pollutants. Chlorofluorocarbons (CFCs) are air pollutants that are mainly responsible for the depletion of ozone layer in the stratosphere. Besides, methane (CH_4) and oxides of nitrogen (NO_x) also cause destruction of ozone.

Ozone hole : Decline in thickness of ozone layer in a restricted area is called ozone hole. Ozone hole was first discovered over **Antarctica in 1985**. Amount of atmospheric ozone is measured by Dobson spectrometer and is expressed in Dobson units (DU).

HARMFUL EFFECTS

- ❖ Skin cancer and skin disorder.
- ❖ Cornea layer will slowly become opaque which will cause slow blindness.
- ❖ Change at genetic level may lead to genetic disorder.
- ❖ Ultraviolet rays weaken the immune system.
- ❖ An excess of ultraviolet light kills phytoplankton, the minute aquatic plant life, resulting in the disturbance of the food chain.
- ❖ These rays also disrupt global rainfall and can cause ecological imbalance.

POINTS TO BE REMEMBER

- ☞ The availability of water decides not only the number of individuals of each species that are able to survive in a particular area, but it also decides the biodiversity of life there.
- ☞ Besides, the availability of water, other factors like the temperature and nature of soil play significant role in deciding the sustainability of life in a region.
- ☞ The organic materials present in the soil in the form of decayed dead plant & animal matter, is called humus. Humus makes the soil more porous to allow water and air to penetrate deep in the ground & also increase water holding capacity of soil.
- ☞ In terrestrial ecosystems, more than 90 percent of the moisture passes through plants by transpiration and only 10 percent evaporates directly from surfaces.



NCERT QUESTIONS WITH SOLUTIONS

Q.1 How is our atmosphere different from the atmosphere on Venus and Mars?

Ans. Unlike Earth, which has 0.03% carbondioxide, on planet Venus and Mars, carbon dioxide (CO_2) forms the major component constituting upto 95-97% of the atmosphere. Nitrogen and oxygen are absent on Mars and Venus but Earth has 78.08% nitrogen and 20.94% oxygen. They also do not have atmospheric water vapour. No life is known to exist on Venus and Mars unlike earth.

Q.2 How does atmosphere act as a blanket?

Ans. Atmosphere acts as a blanket which provide protection to the organisms. It keeps the average temperature of the earth steady during the day and even throughout the year. The ozone layer of the atmosphere absorbs most of the harmful ultraviolet radiations from the sun thereby protecting humans and other organisms from their harmful effects.

Q.3 What causes winds?

Ans. Winds are created due to movement of air from one place to the other. Due to solar radiations the air gets heated up and rises upwards. This creates an area of low pressure. Now cooler air from adjacent high pressure area passes into this area. This creates breezes and wind. Various factors affect the wind movements like uneven heating of land and water, rotation of earth and mountain barriers.

Q.4 How are clouds formed?

Ans. Clouds are wet air masses that float in the direction of prevailing wind. When the solar radiations heat the water in water bodies, a large amount of water gets evaporated into the air. The air which carry water vapour also gets heated. The hot air rises up and carry water vapour along with it. The temperature in the atmosphere is low which causes water vapour to condense into the water droplets. These droplets condense around dust particles. Slowly the water droplets grow bigger and bigger. This huge collection of water droplets is called cloud.

Q.5 List any three human activities that you think would lead to air pollution.

Ans. (i) Burning of fossil fuels in automobiles
(ii) Burning of fossil fuels in thermal power plants
(iii) Smoke produced from industries

Q.6 Why do organisms need water?

Ans. Organisms need water because it is major component (60-90%) of living matter. It plays a vital role in the metabolic reactions taking place within their body. Water acts as universal solvent and provides a medium for the chemical reactions to occur in body. Various substances in dissolved form are also transported from one part of body to other. Water protects the body from sudden changes of temperature. It helps in separation and elimination of metabolic wastes. Therefore to survive, it is necessary for the organisms to maintain the level of water within their bodies.

Q.7 What is the major source of fresh water in the city/town/village where you live?

Ans. Major source of fresh water in the city/town/village where we live is underground water.

Q.8 Do you know any activity which may be polluting this underground water source?

Ans. Sewage and industrial tanks are polluting this underground water source.

Q.9 How is soil formed?

Ans. Soil is formed due to weathering of huge rocks by temperature variations, rainwater, winds and living organisms. Other processes which are involved in the formation of soil are decomposition of organic matter and subsequent humification and mineralisation.

Q.10 What are the methods of preventing or reducing soil erosion?

Ans. Soil erosion can be prevented by following methods

- (i) Intensive cropping
- (ii) Growing grasses and xerophytes
- (iii) Terrace farming
- (iv) Proper drainage canal around the fields
- (v) Making strong embankments along river banks.



Q.11 What is soil erosion?

Ans. The removal of top fertile layer of soil from its original position to another place due to strong winds and running water is called soil erosion.

Q.12 What are different states in which water is found during the water cycle?

Ans. In water cycle, water is found in liquid (as rain) and vapour form (found in air and ultimately form clouds) and sometimes in the form of snow at mountains.

Q.13 Name two biologically important compounds that contain both oxygen (O₂) and nitrogen (N₂)

Ans. Nucleic acid (DNA and RNA) and proteins are two biologically important compounds that contain both oxygen and nitrogen.

Q.14 List any three human activities which could lead to an increase in CO₂ content of air.

Ans. (i) Burning of fossil fuels (coal, wood, petroleum) in homes, industries, power plants, etc.

(ii) Deforestation leads to reduced utilisation of CO₂ in photosynthesis

(iii) Burning associated with agricultural practices

Q.15 What is the greenhouse effect? **Ans.** Greenhouse effect is to keep an area warm by allowing solar radiations to pass into but preventing long wave radiations to escape due to presence of relatively active gases and glass panels. Carbon dioxide, methane and chlorofluorocarbons present in our atmosphere prevent the escape of heat from the earth.

These are called greenhouse gases. An increase in the percentage of such gases in the atmosphere would cause the average temperature to increase worldwide and this is called global warming.

Q.16 What are the two forms of oxygen found in atmosphere?

Ans. Molecular oxygen (O₂) and ozone (O₃)

Q.17 How are living organisms dependent on the soil? Are organisms that live in water totally independent of soil as a resource?

Ans. Soil is a complex mixture, comprising of minerals (45%), organic matter (5%), water (25%), air (25%) and living organisms. It is an important resource which is responsible for the diversity of life in an area. Plants are dependent on soil for obtaining nutrients and water and all terrestrial organisms depend upon plants for their food and its contained energy. So, all living terrestrial organisms depend upon soil. Organisms living in water are not totally independent of soil as a resource because some aquatic decomposers present at bottom of water, decompose dead bodies of plants and animals. The released nutrients from the organic matter get dissolved in water and are then taken by plants and animals.

Q.18 You have seen weather reports on television and in newspapers. How do you think we are able to predict the weather?

Ans. We see daily weather reports on television and newspapers. The information are actually recorded by meteorological laboratories of different cities present in our country. Information such as direction and speed of wind, average daily minimum and maximum temperature are recorded and then displayed on television or published in newspapers. The meteorological information helps us to predict the weather and to act accordingly. For example, a farmer can decide his next step in agriculture according to latest weather report and may be benefitted.

Q.19 We know that many human activities lead to increasing levels of pollution of air, water bodies and soil. Do you think that isolating these activities to specific and limited areas would help in reducing pollution?

Ans. Many human activities lead to increased level of pollution of air, water bodies and soil. Isolating such activities to specific and limited areas will not reduce pollution in that area. The benefits of such practices are

(i) Joint pollution treatment plants can be introduced.

(ii) The residential and commercial areas will be comparatively free from pollution.

Q.20 Write a note on how forests influence the quality of our air, soil and water resources.

Ans. Forest influence the quality of our air, soil and water resources in following ways:

(i) Plants maintain the oxygen and carbon dioxide balance in the atmosphere.

(ii) Roots of plant hold the soil and do not allow its erosion by fast wind or fast moving water.

(iii) By preventing soil erosion, forests maintain the quality of water resources as well and control silting.



EXERCISE – I

BOARD PROBLEMS

VERY SHORT ANSWER TYPE QUESTIONS

- Q.1** Name the substances which are responsible for damaging ozone layer.
- Q.2** What are different stages in which water is found during the water cycle?
- Q.3** Where ozone hole was first discovered?
- Q.4** What are the two forms of oxygen found in the atmosphere?
- Q.5** What is the ultimate source of energy for organisms?
- Q.6** Give definition of Bio-Geochemical cycle.
- Q.7** Name a free-living bacterium which helps in nitrogen fixation.
- Q.8** Name the main reservoir of gaseous carbon.
- Q.9** Name any two Green house gases.
- Q.10** What is green house effect?

SHORT ANSWER TYPE QUESTIONS

- Q.1** Mention few harmful effects which are caused due to depletion of ozone layer.
- Q.2** Write a short note on water cycle.
- Q.3** Write a short note on Green house effect.
- Q.4** Write a short note on carbon cycle.
- Q.5** Name the micro-organisms which are involved in :-
(a) Biological nitrogen fixation
(b) Nitrification
(c) Denitrification

LONG ANSWER TYPE QUESTION

- Q.1** Draw a labelled diagram to show :
(a) Nitrogen cycle in nature.
(b) Carbon cycle in nature.
(c) Oxygen cycle in nature.
- Q.2** Explain nitrogen cycle.
- Q.3** Write an essay on ozone layer.

REASONING ANSWER TYPE QUESTION

- Q.1** Why ozone layer is important for us?
- Q.2** "Increased concentration of carbon-dioxide in air is cause of Global warming" Why?

FILL IN THE BLANKS

- Q.1** In some terrestrial ecosystems more than percent of the moisture passes through plants.
- Q.2** Water is a compound of two vital elements and
- Q.3** Conversion of atmospheric nitrogen into nitrogen compounds by living organisms is called
- Q.4** The process of conversion of ammonia into nitrites and nitrates is called nitrification. It is carried out by the action of and
- Q.5** Denitrification is carried out by bacteria.
- Q.6** The plants use as one of the raw materials for the process of photosynthesis and prepare carbohydrates.
- Q.7** Both plants and animals release carbondioxide in the atmosphere by the process of
- Q.8** Water forms percent of the cell content.
- Q.9** In nature, oxygen occurs in the gaseous form constituting percent of the total atmosphere.
- Q.10** Ozone layer is about km thick. It absorbs harmful radiations come from the sun.

ANSWER KEY

SUBJECTIVE QUESTION

- | | |
|--------------------------|----------------------------|
| 1. 90 | 2. Hydrogen, Oxygen |
| 3. Ammonification | 4. Fungi & bacteria |
| 5. Pseudomonas | 6. Carbondioxide |
| 7. Respiration | 8. 60 – 90 |
| 9. 21 | 10. 5 |



EXERCISE – II

OLYMPIAD QUESTIONS

- Q.1** A pollutant is any substance, chemical or other factor that changes natural :
 (A) geo-chemical cycle
 (B) flora of a place
 (C) balance of our environment
 (D) wild life of a region
- Q.2** The pollutant released from motor vehicles :
 (A) CO_2 (B) CO
 (C) NO_2 (D) None
- Q.3** Lichens do not like to grow in cities because of :-
 (A) SO_2 pollution
 (B) Missing natural habitat
 (C) Absence of right type of algae and fungi
 (D) Lack of moisture
- Q.4** Carbon dioxide in atmospheric air amounts to be about :
 (A) 0.003% (B) 33%
 (C) 0.03 % (D) 0.3 %
- Q.5** Greenhouse effect is related to :
 (A) Green trees on house
 (B) Global warming
 (C) Grasslands
 (D) Greenery in country
- Q.6** The greenhouse effect is due to :
 (A) impermeability of long wavelength radiations through CO_2 of the atmosphere
 (B) penetrability of low wavelength radiations through O_3 layer
 (C) penetrability of low wavelength radiations through CO_2
 (D) impermeability of long wavelength radiations through O_3 layer.
- Q.7** Which of the following gases contributes maximum to the 'Greenhouse effect' on earth ?
 (A) Carbon dioxide
 (B) Methane
 (C) Chlorofluorocarbon
 (D) Freon
- Q.8** Which of the following is not a "Greenhouse gas" ?
 (A) SO_2 (B) CO_2
 (C) N_2O (D) CH_4
- Q.9** What are the chief pollutants of the atmosphere which are most likely to deplete the ozone layer ?
 (A) Sulphur dioxide
 (B) Carbon dioxide
 (C) Carbon monoxide
 (D) Nitrogen oxides and chloro fluorocarbons
- Q.10** Formation of ozone hole is maximum over :
 (A) India (B) Antarctica
 (C) Europe (D) Africa
- Q.11** Which of the following is the main factor of water pollution ?
 (A) Pesticides (B) Ammonia
 (C) Detergents (D) Industrial wastes
- Q.12** Often in water bodies subjected to sewage pollution, fishes die because of the :
 (A) pathogens released by sewage
 (B) reduction of dissolved oxygen caused by microbial activity
 (C) clogging of their gills by solid substances
 (D) foul smell
- Q.13** Spraying of DDT on crops produces pollution of :
 (A) Air only
 (B) Air and soil only
 (C) Air and water only
 (D) Air, soil and water
- Q.14** Soil pollution is chiefly caused due to indiscriminate use of :
 (A) Insecticides (B) Nutrients
 (C) Wheat crops (D) none of these
- Q.15** Which disease is not water borne ?
 (A) Cholera (B) Typhoid
 (C) Dysentery (D) Asthma
- Q.16** The supersonic jets cause pollution by thinning of :
 (A) CO_2 layer (B) SO_2 layer
 (C) O_2 layer (D) O_3
- Q.17** Agricultural chemicals denote :
 (A) Pesticides
 (B) Fertilizer
 (C) Growth regulators
 (D) All of these
- Q.18** A logical sequence of carbon cycle is :-
 (A) Producer - Consumer - Decomposer
 (B) Decomposer - Producer - Decomposer
 (C) Consumer - Producer - Consumer
 (D) Producer - Decomposer - Consumer
- Q.19** Biogeochemical cycles are also known as :-
 (A) Sedimentary Cycles
 (B) Gaseous Cycles
 (C) Material Cycling
 (D) Cycles of water



- Q.20** Which of the following is a free living nitrogen fixing bacterium present in soil ?
 (A) Azotobacter (B) Nitrosomonas
 (C) Rhizobium (D) Pseudomonas
- Q.21** CO₂ and O₂ balance in atmosphere is due to :-
 (A) Photosynthesis
 (B) Respiration
 (C) Leaf anatomy
 (D) Photorespiration
- Q.22** Role of bacteria in carbon cycle is
 (A) Photosynthesis
 (B) Chemosynthesis
 (C) Break down of organic compounds
 (D) Assimilation of nitrogen compounds
- Q.23** Under anaerobic conditions, denitrifying bacterium *Pseudomonas* changes
 (A) Nitrate to molecular nitrogen
 (B) Nitrate to ammonia
 (C) Nitrate to nitrite
 (D) Nitrite to nitrate
- Q.24** If the plants of world die, all the animals will also die due to the shortage of
 (A) Cold (B) Food
 (C) Oxygen (D) Timber
- Q.25** In a natural ecosystem decomposers include:
 (A) Bacteria & Fungi
 (B) Parasitic algae
 (C) Macroscopic animals
 (D) All the above
- Q.26** Suppose all consumers of the earth are dead. Then
 (A) Producers will not prepare food
 (B) Decomposers will die
 (C) There will be no sunlight available by photosynthesis.
 (D) None of these
- Q.27** Why does a goat not eat a tiger?
 (A) Because the tiger is more powerful than the goat
 (B) Because the goat is not adapted to eat flesh.
 (C) Because every goat is taught by its parents to keep away from tigers.
 (D) All of these
- Q.28** The correct food chain out of the following is
 (A) Tiger → Cat → Lion → Goat
 (B) Grass → Insects → Lizard → Snake
 (C) Grass → Rabbit → Lion → Man
 (D) Sun → Plant → Insect → Man
- Q.29** Following is an incomplete food chain:
 Grass → ? → Jackal → tiger. The choice for the correct answer will be
 (A) Lion (B) Deer
 (C) Rat (D) Cockroach
- Q.30** The loss of energy in successive steps of energy transfer is approximately
 (A) 20% (B) 25%
 (C) 10% (D) 2%
- Q.31** Environmental planning will
 (A) reduce spoilage by bacteria
 (B) cause more wildlife loss
 (C) reduce air and water pollution
 (D) None of these
- Q.32** An example of aerosol spray is
 (A) Dichloro difluoro methane
 (B) Tetra chloromethane
 (C) Trichloro methane
 (D) Di-iododibromo methane.
- Q.33** The full form of DDT is
 (A) Dibromo Dichloro Toluene
 (B) Dichloro Diphenyl Trichloroethane
 (C) Difluorodichloro Terbutaline
 (D) None of these
- Q.34** Lichens are found on hillsides under conditions where neither the alga nor the fungus can live alone. This shows that the relationship between the alga and the fungus is one of
 (A) Parasitism (B) Saprophytism
 (C) Mutualism (D) Commensalism
- Q.35** Organic matter decayed to a relatively stable, amorphous state; formed when soil microorganisms decompose animal and plant material into elements usable by plants
 (A) manure (B) peat
 (C) humus (D) green manure
- Q.36** The species, which are in danger of extinction, are referred to as
 (A) endangered species
 (B) vulnerable species
 (C) threatened species
 (D) rare species
- Q.37** Minamata disease is a pollution-related disease, which results from
 (A) release of human organic waste into drinking water
 (B) accumulation of arsenic into atmosphere
 (C) release of industrial waste mercury into fishing water
 (D) oil spills into sea



Q.38 Eutrophication leads to death of fish due to

- (A) increased O₂ content
- (B) increased algae content
- (C) decreased algae content
- (D) decreased O₂ content

ANSWER KEY

1. C 2. B 3. A 4. C

Q.39 The two great industrial tragedies namely, MIC and Chernobyl tragedies respectively occurred where and at which time?

- (A) Bhopal 1984, Ukraine 1990
- (B) Bhopal 1984, Ukraine 1988
- (C) Bhopal 1984, Ukraine 1986
- (D) Bhopal 1986, Russia 1988

5. B 6. A 7. A 8. A

9. D 10. B 11. D 12. B

Q.40 NO₂ vapours are harmful to the body because

- (A) They produce allergy
- (B) They produce respiratory problems
- (C) They create blood clots
- (D) None of these

13. D 14. D 15. D 16. D

Q.41 Why is smoking injurious to health?

- (A) It can casue pregnanacy problems in smoking mothers.
- (B) It can cause large scale air pollution
- (C) It can be responsible for a heart attack
- (D) Both (A) and (B)

17. D 18. A 19. C 20. A

21. A 22. C 23. A 24. B

Q.42 'Decibel' is a unit to measure

- (A) Sound depth
- (B) Sound intensity
- (C) Sound wavelength
- (D) All of these

25. A 26. B 27. B 28. B

29. B 30. C 31. C 32. A

Q.43 An effective method to stop air pollution is

- (A) Degradation of wastes causing air pollution
- (B) Keeping the river water clean
- (C) Keeping factories away from big cities.
- (D) None of these

33. B 34. C 35. C 36. A

Q.44 The Ganga purification project is controlled by

- (A) Central Water Commission
- (B) Union Public Service Commission
- (C) Central Pollution Control Board
- (D) Central Intelligence Agency.

37. C 38. D 39. C 40. B

Q.45 Sunder Lal Bahuguna is associated with the

- (A) Salt movement
- (B) Green revolution
- (C) Greenhouse effect
- (D) Chipko movement.

41. D 42. B 43. C 44. C

45. D



EXERCISE – III

NTSE / ISO / IJO QUESTIONS

1. Suppose all consumers of the earth are dead. Then
(A) Producers will not prepare food
(B) Decomposers will die
(C) There will be no sunlight available by photosynthesis.
(D) None of these
2. Why does a goat not eat a tiger?
(A) Because the tiger is more powerful than the goat
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(C) Difluorodichloro Terbutaline
(D) None of these
9. Lichens are found on hillsides under conditions where neither the alga nor the fungus can live alone. This shows that the relationship between the alga and the fungus is one of
(A) Parasitism (B) Saprophytism
(C) Mutualism (D) Commensalism
10. Organic matter decayed to a relatively stable, amorphous state; formed when soil microorganisms decompose animal and plant material into elements usable by plants
(A) manure (B) peat
(C) humus (D) green manure
11. The species, which are in danger of extinction, are referred to as
(A) endangered species
(B) vulnerable species (C) threatened species
(D) rare species
12. Minamata disease is a pollution-related disease, which results from
(A) release of human organic waste into drinking water
(B) accumulation of arsenic into atmosphere
(C) release of industrial waste mercury into fishing water
(D) oil spills into sea
13. Eutrophication leads to death of fish due to
(A) increased O_2 content
(B) increased algae content
(C) decreased algae content
(D) decreased O_2 content
14. The two great industrial tragedies namely, MIC and Chernobyl tragedies respectively occurred where and at which time?
(A) Bhopal 1984, Ukraine 1990
(B) Bhopal 1984, Ukraine 1988
(C) Bhopal 1984, Ukraine 1986



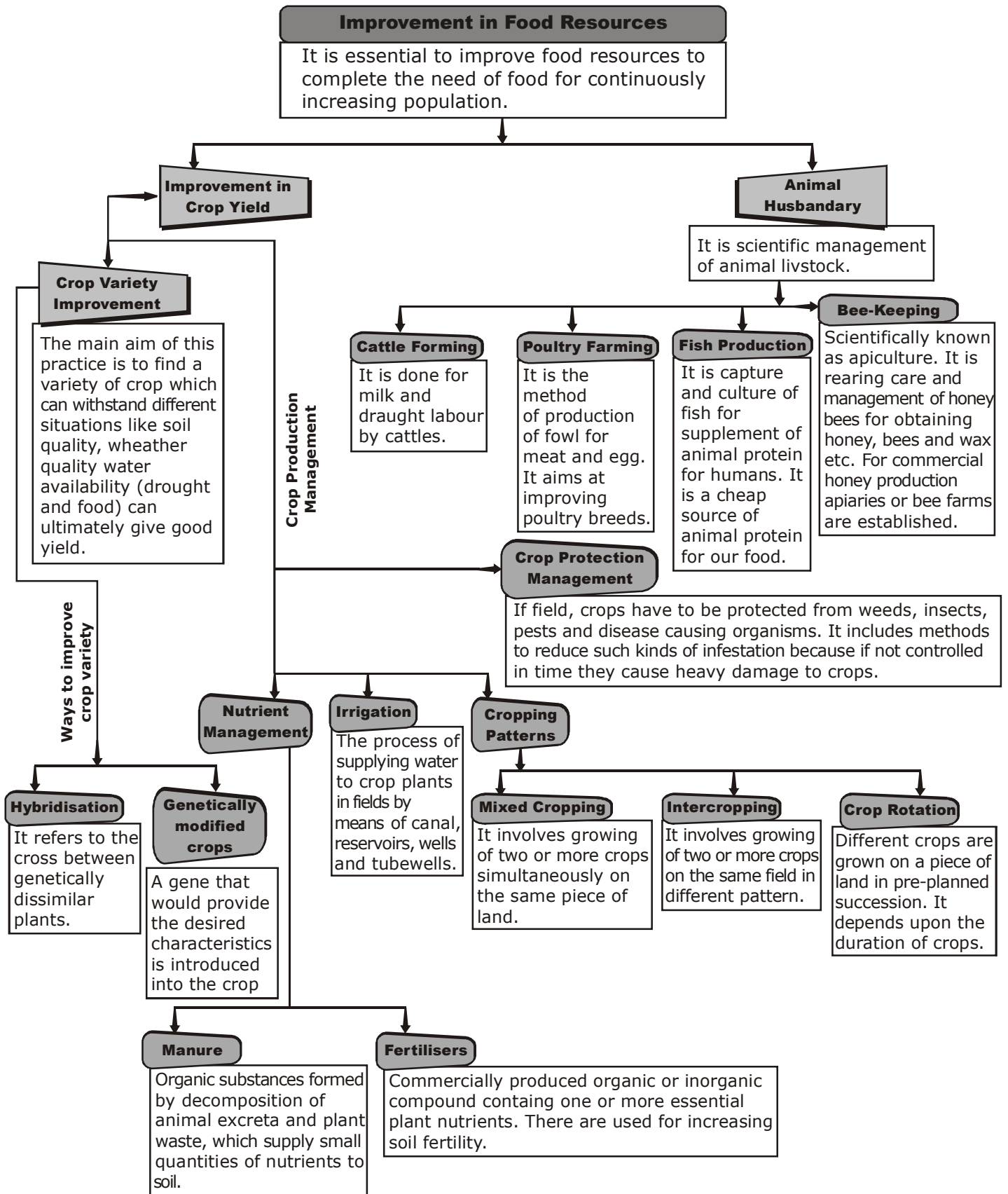
- (D) Bhopal 1986, Russia 1988
- 15.** NO₂ vapours are harmful to the body because
 (A) They produce allergy
 (B) They produce respiratory problems
 (C) They create blood clots
 (D) None of these
- 16.** Why is smoking injurious to health?
 (A) It can casue pregnanacy problems in smoking mothers.
 (B) It can cause large scale air pollution
 (C) It can be responsible for a heart attack
 (D) Both (A) and (B)
- 17.** 'Decibel' is a unit to measure
 (A) Sound depth (B) Sound intensity
 (C) Sound wavelength (D) All of these
- 18.** An effective method to stop air pollution is
 (A) Degradation of wastes causing air pollution
 (B) Keeping the river water clean
 (C) Keeping factories away from big cities.
 (D) None of these
- 19.** The Ganga purification project is controlled by
 (A) Central Water Commission
 (B) Union Public Service Commission
 (C) Central Pollution Control Board
 (D) Central Intelligence Agency.
- 20.** Sunder Lal Bahuguna is associated with the
 (A) Salt movement (B) Green revolution
 (C) Greenhouse effect (D) Chipko movement.

ANSWER KEY

1.	B	2.	B	3.	B	4.	B
5.	C	6.	C	7.	A	8.	B
9.	C	10.	C	11.	A	12.	C
13.	D	14.	C	15.	B	16.	D
17.	B	18.	C	19.	C	20.	D



IMPROVEMENT IN FOOD RESOURCES



INTRODUCTION

Food is the combination of various organic and inorganic substances which is capable of providing

- (i) Energy for the various metabolic activities.
- (ii) Materials for repair / replacement of worn-out tissues in the body.
- (iii) Materials for growth & reproduction.
- (iv) Regulatory substances, body secretions and metabolic activities etc. 70% of India's economy is based on agriculture and 40% of G.N.P (Gross National Product) comes from agriculture.
- (a) **Agriculture** : (Ager means field ; culture means cultivation). It is the applied biological science which deals with the production of plants and raising of animals useful to man, involving soil cultivation, breeding and management of crops and livestock.
- (b) **Horticulture** : (Hortus-garden ; cultura-cultivation). It is the branch of agriculture and the science of growing vegetables, fruits and ornamental plants.
- (c) **Silviculture**: (Sylvan- wood and trees) Cultivation of wood and trees e.g.-pine, teakwood, sesamum etc.
- (d) **Sources of food** : Plants provide us with foods like cereals, pulses, oil seeds, fruits and vegetables, on this basis plants are classified as follows :

TABLE : CLASSIFICATION OF CROP PLANTS

Type of crop plant	Examples	Importance
1. Cereals	Wheat, Rice, Maize, Minor energy millets, Sorghum requirements.	Rich in carbohydrates for
2. Pulses	Gram (Ghana), Pea (Matar) builders.	Rich in proteins that are body
3. Oil seed crops	Black gram (Moong), Pigeon pea (Arhar), Lentil (Masoor) etc.	Rich in oils and fatty acid
4. Root crops	Soyabean, Groundnut	It is utilized as the vegetables &
5. Sugar crops	Sunflower, Niger, Sesame, Castor, Mustard, Linseed .	
6. Fibre crops	Turnip, Carrot, Turmeric, medicines Sweet potato & Ginger	Important for wine industry.
7. Plantation crops	Sugarcane and Beet	Important for jute & cotton
8. Fodder crops	Jute & Cotton industry.	Increases cash as are also
9. Horticulture crops	Tea, Coffee, Coconut and Rubber called cash crops.	Provides fodder for animals
	Berseem, Maize, Sorghum and Elephant grass.	Provides vitamins, minerals
	Apple, Banana, Guava, along (Fruits and vegetables) with small three quantities of	Pomegranate, Pears, Chillies,
	Coriander, Jeera, Carrot, Raddish, Cabbage, Cauliflower, Spinach, Cucurbit.	carbohydrates, proteins and oils.

- (e) **Crop Seasons** : Different types of crops require different climatic conditions like :

- (i) Temperature
- (ii) Photoperiod (duration of light)
- (iii) Completion of life cycle



(f) **Depending upon the growing season, there are two groups of crops :**

Kharif crop/ Rainy season crop

(a) Grown during monsoon/rainy season

(b) They require warm and wet weather

(c) They are sown in June-July and harvested September/October

(d) Examples- Rice, Jowar, Bajra, Cotton, Urad, Moong etc.

Rabi crop/ Winter season crop

(a) Grown during winter season

(b) They require cold and dry weather

(c) They are sown in October/November & harvested in March-April

(d) Examples- Wheat, Barley, Gram, Peas, Groundnut, Mustard, Potato etc.

IMPROVEMENT IN CROP YIELD

To obtain the high yields from our farms the following three scientific approaches are adopted.

(a) Varietal improvement of crop through genetic manipulation.

(b) Crop Production Management.

(c) Crop protection management.

I. Improvement in Crop Yield : In India, there has been a four times increase in the production of food grains from 1960 to 2004. However, cultivable land area has increased by only 24 per cent. The yield of a crop can be increased by adopting number of improved agricultural practices, from sowing to harvesting. The various practices that are followed at various stages of production are as follows :

(i) Preparation of soil

(ii) Sowing

(iii) Application of manures and fertilizers

(iv) Irrigation

(v) Weed control

(vi) Crop protection

(vii) Harvesting, threshing and winnowing

(viii) Storage

(ix) Crop improvement

(x) Rotation of crops, mixed and multiple cropping.

(a) **Varietal Improvement of crops through genetic manipulation :** The principal aim of varietal improvement is to get as many of the desirable & economic characters as possible in one variety.

1. Aims of crop improvement are :

(i) Increased yield-Developing high yielding varieties

(ii) Improved quality

(iii) Early and uniform maturity

(iv) Insensitivity to light and temperature

(v) Wider adaptability

(vi) Lodging-resistant varieties

(vii) Desirable agronomic characters

2. Plant Breeding : The technique of producing improved varieties of crop plants by the introduction of several desired characters into them is called as plant breeding. Scientists concerned with the improvement of crop varieties are called as plant breeders.

3. Aims of plant breeding : New varieties of crop plants have :

(i) Higher yield.

(ii) Resistance to heat, frost, drought

(iii) Pest resistance

(iv) Early maturing varieties

4. Methods for the genetic improvement of crop plants :

(i) Introduction

(ii) Selection

(iii) Hybridization

(i) **Introduction :** It refers to the taking of superior varieties of crop plants from the place of their natural cultivation to the place where they were never grown earlier.



(ii) Selection: It is the process in which economic plants having best desired characters are picked up from the given population and seeds of such plants are used for future cultivation. For e.g. Maize & Cabbage are represented by their cultivated varieties only.

Selection can be { **Natural** - Survival of the fittest
Artificial - Based on the human needs and interests

(iii) Hybridization: It means the process of crossbreeding of two genetically dissimilar varieties of crop plants (each having a specific and better characteristics) to obtain a new crop plant having both the desired characteristics is called as hybridization. Crop plants produced in this way are called as hybrid varieties or high yielding varieties.

Parent 1 (with a desired character, like high-yield)	x ↓	Parent 2 (with a desired character, like disease -resistance)
--	--------	---

Hybrid variety

(High-yielding and disease-resistant)

Hybridization may be { **Inter varietal** - Between two different varieties
Inter specific - Between two species of same genus
Inter generic - Between plants belonging to different genera.

II. Green Revolution was a process by which India's production of wheat, rice, maize and several other food grains was tremendously increased in the late 1960s and early 1970s. India, which was earlier said to carry a 'begging bowl' to the West for foodgrain, claimed self sufficiency. This revolution was due to the new agricultural technologies whereby high - yielding hybrid varieties of wheat and rice were grown in India. Fertilizers and pesticides were used. Irrigation facilities were improved. Dr. M.S. Swaminathan played a key role in bringing about the 'green revolution'.

III. Dr. M.S. Swaminathan Padam Vibhushan Professor M.S. Swaminathan, FRS, is the Father of 'green revolution' in India. He stressed the need for the reorientation of the breeding programme and his work led to the era of dwarf varieties in India. In 1967, he developed a high-yield dwarf variety of wheat, **Sharbati Sonara**. Being a plant geneticist, he has contributed to the development of agriculture in India. He has held various important positions in India and abroad.

(b) Crop Production Management : In order to improve and manage our crop production system, we have to focus on cheaper and farmer friendly approaches. As there is direct co-relationship between the higher yields and input applications.

(i) Successful crop production depends upon:

- (a) Understanding how crops develop and grow.
- (b) How various factors affect the growth and development of crops and
- (c) How each factor can be modified and managed.

(ii) Approaches for crop production includes:

- | | | |
|--------------------------------|--------------------------|---------------------------|
| (a) Nutrient management | (b) Irrigation | (c) Mixed cropping |
| (d) Inter cropping | (e) Crop rotation | |

1. Nutrient management: Plant nutrients are the mineral elements needed by the plants for their growth, development and maintenance. Plants absorb a large number of elements from soil, besides water and air, only (16) elements are essential nutrients for plants, out of (40) elements present in plant ash. They are-

- | | | | | |
|-----------------------|-------------------------|-------------------------|------------------------|---------------------|
| (i) Carbon | (ii) Iron | (iii) Hydrogen | (iv) Manganese | (v) Oxygen |
| (vi) Boron | (vii) Nitrogen | (viii) Zinc | (ix) Phosphorus | (x) Copper |
| (xi) Potassium | (xii) Molybdenum | (xiii) Magnesium | (xiv) Chlorine | (xv) Sulphur |
| (xvi) Calcium | | | | |



- **Sources of Plant nutrient:** The plants obtain their nutrients mainly from the soil. Out of the total 16 nutrients, as many as 13 are absorbed from the soil.

SOURCES OF PLANT NUTRIENTS

Soil Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Iron, Manganese, Boron, Zinc, Copper, Molybdenum Chlorine

Air Carbon, Oxygen

Water Hydrogen

I. Characteristics of an essential plant nutrient:

- (i) In the absence of such element, the plant is not able to complete its life cycle.
- (ii) Such element must have a direct influence on the plant nutrition and metabolism.
- (iii) The requirement of such element must be specific and cannot be replaced by another element
- (iv) Deficiency of such element can be corrected or prevented only by supplying that nutrient.

II. Classification of plant nutrients: On the basis of quantities required, (13) mineral nutrients obtained from soil needed for plant growth have been grouped into two categories.

(i) Macronutrients (ii) Micronutrients

Macronutrients- Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur.

Micronutrients- Iron, Manganese, Copper, Zinc, Boron, Molybdenum, Chlorine.

Of the sixteen essential nutrients, some are required by plants in relatively large amounts than the others. The nutrients required in relatively large quantities are called macronutrients or major elements, while the ones required in very small quantities or traces are called micronutrients or minor elements. Deficiency of the nutrients affects physiological processes in plants as well as their reproduction, growth, and susceptibility to diseases. To overcome the deficiency of nutrients, the soil can be enriched by adding manures and fertilisers.

Besides these, carbon, oxygen and hydrogen are called **framework elements**.

1. Food supplies all the required nutrients for the development, growth and health of the body.
2. Cereals like wheat, provide carbohydrates, pulses (grams) provide proteins and oil seeds provide fats.
3. Hybridization is crossing between genetically dissimilar plants (inter varietal, inter specific or inter generic).
4. Improvement of agriculture is done for higher yield, biotic and abiotic resistance, improved quality grade, adaptability and other factors.
5. Macronutrients are those that are required in large quantities by the body (N, P, K, Ca, Mg, S, etc.).
6. Micronutrients are those that are required in small quantities (Mn, B, Zn, etc.).
7. Manure contains organic matter and supplies nutrients to the soil. It is prepared by the decomposition of animal excreta and plant waste.
8. The process in which waste material is decomposed is known as composting. Composts prepared by using earthworms is called vermi compost.
9. Fertilizers are commercially produced and supply nitrogen, phosphorus and potassium.
10. Continuous use of fertilizers in an area can destroy soil fertility and also lead to water pollution.
11. To reduce the harmful effects of fertilizers organic farming (use of biofertilizers & organic manure) should be practiced.
12. Use of wells, canals, river lift systems, tanks, rain water harvesting and watershed management has increased the water availability for agriculture.
13. Mixed cropping is growing two or more crops simultaneously on the same piece of land. For example wheat and mustard are often grown together.



14. Inter cropping is growing of two or more crops in the same field but in a definite pattern. For example maize and soyabean crops are grown alternately.
15. Insects, rodents, fungi, bacteria, etc. cause loss to the stored grains.
16. Animal husbandry is the scientific management of animal livestock.
17. Milk producing animals are called milch animals and those that are used for farm labour are called draught animals.
18. Exotic or foreign breeds have less resistance to diseases when compared to their local counterparts.
19. Poultry is undertaken to increase the production of meat and eggs.
20. Food given to broilers is proteinaceous in nature.
21. Mariculture is done to meet the demands of marine fish.
22. Fish culture is sometimes done in combination with rice crop.
23. Five or six species of fish are raised (grown) in a single pond in order to reduce competition for food. This is called composite fish culture. For example catlas (surface feeders), rohas (middle zone) and mrigals (bottom feeders) are raised together.
24. Rearing of honeybees is called bee-keeping or apiculture.
25. Apis cerana indica (Indian bee), A. dorsata (Rock bee), Apis florae (little bee), Apis mellifera (Italian bee) are generally used in the commercial production of honey.
26. Italian bees have high honey collection capacity.

MANURES AND FERTILIZERS



Manures :

- Manure are organic substances obtained from the decomposition of animal wastes, like cow dung and vegetable wastes by the action of microbes.
- **Types of Manures :**
- (i) **Farmyard Manure (FYM) -**
 - It is formed by the decomposition of a mixture of cattle excreta (dung), urine of cattle, litter and roughage.
 - By the action of micro-organisms all these materials decompose and are used as farmyard manure (FYM).
- (ii) **Compost :**
 - Compost is a biological process in which the above mentioned organic matter is decomposed by both aerobic and anaerobic micro-organisms.
- (iii) **Green Manuring :**
 - The practice of green manuring includes growing turning or ploughing and mixing of green crops with soil to improve physical structure and soil fertility.
 - Green manures may include both leguminous and non leguminous plants.



Fertilizers :

- Fertilizers are the sources of plant nutrients manufactured commercially from chemicals. They are inorganic or organic compounds containing necessary plant nutrients such as nitrogen, phosphorus and potassium.
- The chemical substance which can be used as a fertilizer must have the following characteristics:
 - It must be soluble in water.
 - It should be easily assimilated by plants.
 - It should be fairly stable.
 - It should not be injurious to plants.
 - It should not disturb pH of the soil.
 - It should be cheap.
- Fertilizers are classified according to the element (N, P or K) which they supply to the soil.
 - (i) Nitrogenous fertilizers
 - (ii) Phosphatic fertilizers
 - (iii) Potash fertilizers
 - (iv) NPK fertilizers



(i) Nitrogenous Fertilizers :

- The important nitrogenous compounds used as fertilizers are :
 Ammonium sulphate, $(\text{NH}_4)_2\text{SO}_4$
 Calcium cyanamide, CaCN_2
 Calcium ammonium nitrate, $\text{Ca}(\text{NO}_3)_2$, NH_4NO_3
 Basic calcium nitrate, $\text{Ca}(\text{NO}_3)_2$, CaO
 Urea, $(\text{NH}_2-\text{CO}-\text{NH}_2)$

(ii) Phosphatic Fertilizers :

- The minerals of phosphorus such as phosphorite, $[\text{Ca}_3(\text{PO}_4)_2]$ and apatite, $[\text{3Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2]$ are sparingly soluble in water and thus do not serve as source of phosphorus for plants. These are, therefore, converted into soluble materials which can act as good fertilizers. The important phosphatic fertilizers are :
 Calcium superphosphate
 Nitrophosphate
 Triple phosphate
 Phosphatic slag

(iii) Potash Fertilizers :

- Potassium nitrate, potassium chloride and potassium sulphate are used as fertilizers.

(iv) NPK Fertilizers :

- Fertilizers containing N, P and K in suitable adjusted proportions are known as NPK fertilizers. These are obtained by mixing nitrogenous, phosphatic and potash fertilizers in suitable proportions.

Irrigation

- Irrigation the process of providing water to the soil for the purpose of supplying moisture essential for plant growth.

◆ Irrigation method :

- Wells :** There are two types of wells, namely dug wells and tube wells. In a dug well, water is collected from water bearing strata. Tube wells can tap water from the deeper strata. From these wells, water is lifted by pumps for irrigation.
- Canals :** This is usually an elaborate and extensive irrigation system. In this system canals receive water from one or more reservoirs or from rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.
- River Lift Systems :** In areas where canal flow is insufficient or irregular due to inadequate reservoir release, the lift system is more rational. Water is directly drawn from the rivers for supplementing irrigation in areas close to river.
- Tanks :** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.

Cropping pattern**◆ Mixed Cropping :**

- The process of mixing seeds of two or more different crops and then sowing them in the same field is called mixed cropping.
- Example of mixed cropping -
 (a) Wheat + mustard
 (b) Maize + urad
 (c) Arhar + mung
 (d) Ground nut + sunflower

◆ Advantages of Mixed Cropping :

- There is lesser risk of total crop failure because if one crop fails, then the other crop helps the farmers to overcome his loss.
- Farmers get a variety of products for their family by growing crops under the mixed cropping system, e.g. cereals, pulses, fodder and vegetables may be grown simultaneously.

◆ Intercropping :

- Intercropping is a special type of mixed cropping in which two or more crops are grown simultaneously in the same field following a definite row pattern.



Differences between mixed cropping and intercropping :

	Mixed cropping	Intercropping
1	Marketing of only mixed produce is possible	Produce of each crop can be marketed separately
2	It is difficult to apply pesticides to individual crop	Pesticides can be applied easily to the individual crop
3	Prior to sowing, the seeds of two crops are mixed	Seeds of two crops are not mixed before sowing
4	There is no set pattern of rows	A pattern of rows is observed

CROP ROTATION

The growing of different crops on a piece of land in a pre-planned succession is called crop rotation. Depending upon the duration, crop rotation may be of following three types :

- (a) One year rotation
 1. Maize - Mustard
 2. Rice - Wheat
- (b) Two years rotation
 1. Maize - Mustard-Sugarcane - Fenugreek
 2. Maize - Potato- Sugarcane - Peas
- (c) Three years rotation
 1. Rice - Wheat - Mung - Mustard
 2. Sugarcane - Berseem
 3. Cotton - Oat - Sugarcane - Peas - Maize - Wheat

Selection of Crops of Rotation :

- Source of moisture (through rain or irrigation).
- Status of nutrients in the soil.
- Availability of inputs (such as fertilizers, pesticides, man power and machine power).
- Duration of crop short or long
- Marketing and processing facilities.

Advantages of Crops Rotation :

- Crop rotation helps in replenishment of soil fertility.
- It prevents depletion of selective nutrients.
- It prevents building up of diseases and pests of particular crop.
- It enhances the production by increasing the soil fertility.

Organic Farming :

- Manures are natural fertilizers. They are bulky sources of organic matter which supply nutrients in small quantities but organic matter in large quantities. Manures include farmyard manure (FYM). Compost, green manures, vermicompost, etc.

Advantages of Manures :

Manures affect the soil in following three ways :

- The manures enrich the soil with nutrients. They replenish the general deficiency of nutrients in the soil. Since manures contain nutrients in small quantities, they are needed to be applied in large quantities.
- The manures add organic matter (called humus) to the soil which restores the soil texture for better retention of water and for aeration of soil. For example, organic matter present in the manures increases the water holding capacity in sandy soils and drainage in clayey soil
- The organic matter of manures provide food for the soil organisms (decomposers such as bacteria, fungi, etc.) which help in making nutrients available to plants.
- Thus, organic manures help to improve the physical properties of soil, reduce soil erosion, increase the moisture holding capacity of soil and above all these advantages, they are low cost nutrient carriers.



CROP PROTECTION MANAGEMENT

◆ Crop protection management :

- Field crops are affected by a large number of weeds, pestes disease which cause damage the crops & reduce their productivity.

◆ Weeds :

Weeds are unwanted plants which compete with main crop for nutrition & reduce the growth of crop.

Examples of weeds : -

- * Wild sorghum
- * Chaulai
- * Bathua
- * Parthenium

◆ Methods of weed control :

- Mechanical methods
- Chemical or use of weedicides
- Biological

◆ Pests :

- Harmful creatures for our crop plants are small insects which attack the plants in three ways :

◆ Insect Pest Control :

- Based on the mode of attack, the insect pests are of following three types :

◆ Chewing Insects :

- They cut and chew root, stem and leaves of the plants with the help of their chewing type of mouth parts. e.g., grass hoppers, locusts, caterpillars, grubs etc.

◆ Sucking Insects :

- They suck the cell sap from different parts of the plants with the help of piercing and sucking mouth parts. eg. Aphids, leaf hoppers, plant bugs, etc.

◆ Borer Insects :

- They bore and enter different plant parts, and feed on the plant tissues eg. Sugarcane borer, pod borers, cotton ball weevil, grain weevils, etc.

◆ Methods of Insect Pest Control :

- The root cutting type of insects can be controlled by mixing insecticide in the soil.
- The stem and leaf cutting and boring type of insects can be controlled by dusting or spraying the contact insecticides. eg., malathion, lindane.
- The sap sucking insects can be controlled by spraying systemic insecticides.

DISEASE CONTROL

- A wide variety of plant pathogens such as bacteria, viruses and fungi, exist in our environment.
- Pest infect and cause serious diseases in our crops.
- The diseases caused by these pathogens include blast in paddy (rice), rust in wheat, red rot in sugarcane.

Based on the mode of transmission, plant diseases are of following four types -

Seed Borne Diseases :

- The diseases which spread through seeds are called seed borne diseases, e.g., loose smut of wheat, leaf spot of rice.

Soil Borne Diseases :

- The soil borne diseases mostly affect roots and stems of crop plants, e.g., smut of bajra, tikka disease of groundnut.

Air Borne Diseases :

- The air diseases attack all aerial parts of the plants like leaves, flowers and fruits. e.g., rust of wheat, blast of rice.





Water Borne Diseases :

- The diseases which are transmitted through water are termed as water borne diseases. e.g., bacterial blight of rice.
- Proper and safe storage of food grains is necessary to ensure their availability throughout the year.
- The various factors that contribute to this loss can be placed into two categories -

Biotic Factor :

- Such as insects, rodents (e.g., squirrel, rat), birds (e.g., sparrow, crow, pigeon), fungi, mites and bacteria.

Abiotic Factor :

- Such as moisture content and temperature.
- Higher temperature (i.e., 30 – 32°C) of stored grains make them liable to decay.
- The various types of damages caused by the above factors include
 - (a) Infestation in insects,
 - (b) Degradation in quality,
 - (c) Loss in weight,
 - (d) Poor germinability,
 - (e) Discolouration of produce
 - (f) Poor marketability

ANIMAL HUSBANDRY

Science which deals with the scientific management of farm animals including their feeding, breeding, weeding and heeding (disease control) is called as Animal husbandry.

There are four main practices involved in keeping of animals or animal husbandry.

- **Breeding:** It is done to obtain animals with desired characters. Through breeding, we can develop high milk - yielding and high meat-yielding cattle.
- **Feeding:** It deals with the study of proper food (called feed), mode and time or feeding of different animals.
- **Weeding:** This concerns with the elimination of uneconomical animals.
- **Heeding:** It means the proper care and management of animals.



Animal food mainly comes from:

(i) **Milk:** From cattle such as cow, buffaloes, goat, camel.

(ii) **Egg:** From birds (oultry).

(iii) **Meat:** Animals like pigs, fishes, poultry etc.

(iv) **Honey:** From honey bees.

Table: Nutritional values of Animal Products					
Animal Product	Nutrients (%)				
	Protein	Fat	Carbo	Minerals	Water
Cow Milk	4.0	3.6	3.5	0.7	87.2
Egg	13.0	12.0	Traces	1.0	74.0
Meat	21.1	3.6	Traces	1.1	74.2
Fish	19.0	2.5	Traces	1.3	77.2

Various types of animal farming are:

(i) **Cattle farming** - (Milk producing or milch animals)

(ii) **Poultry farming** - (Egg yielding animals)

(iii) **Fish farming** - (meat providing fishes)

(iv) **Bee keeping** - (Honey providing bees)



CATTLE FARMING

Farming of cattle for milk and labour is called cattle farming.

AVERAGE MILK PRODUCTION BY COW BREEDS		
Dairy breeds of cows	Average milk production (litres)	Lactation periods (days)
Sahiwal	2800	300
Holstein Friesian	16000	365
Frieswal	5000	326

- (A) Milk producing breeds:** Milk providing animals are - cows, buffaloes, goats, camels.
- Breeds of Cow:** Cows are a good source of milk for food of human beings and bullocks help in farming and transport purposes. Based upon the milk production and other utility, various breeds of cow are categorized in three types i.e.
- Milch breeds or dairy breeds
 - Draught breeds
 - Dual purpose or general utility breeds.
- (I) Milch or Dairy breeds:** Milch or dairy breed cows are of three types in India I.e.
- Indigenous breeds
 - Exotic breeds and
 - Cross breeds.
- (a) Indigenous breeds:** These are the Indian breeds of milch or dairy cows. These are
- Red Sindhi
 - Sahiwal
 - Gir
- (b) Exotic breeds:** These are foreign breeds of cows which have been introduced in our country. The selected breeds of cows that have been successfully used for cross breeding in our country are:
- Jersey: England
 - Holstein Friesian: Hoiland
 - Brown Swiss :A dual purpose breed of cow from Switzerland
- (c) Cross breeds/Improved breeds of cows:** Cross or improved breeds of dairy cows have been developed in India at National Dairy Research Institute (NDRI) Kamal (haryana).The successful
- Cross breeds of cow in our country are:
- Karan Swiss:** This is the cross breed of Brown Swiss and Sahiwal.
 - Karan Fries :** This is the cross breed of Holstein-Friesian from Holland and Tharparkar of India. The yield of milk from new cross breed cows has increased two to three times more than our indigenous cows.
- (II) Draught breeds:** Cattle of this breed are strong and sturdy. They are the "beasts of burden: I.e. are used for drawing bullocks carts, ploughing land of crop fields are transporting materials from one place to another.The cows of these breeds produce less milk. Some of the common examples of these breeds are Malvi, Nageri, Hllikar, Kangayam etc.
- (III) Dual Purpose or General utility breeds:** In these breeds, the cows are good milk yielders and bullocks are good for draught work. Some of the breeds of this category are Haryana, Tharparkar, Ongole, Kankrej etc.

TYPES OF BREEDS OF CATTLE	
Draught breeds	Strong & sturdy chiefly for labour
Dairy or milk breeds	Specialized in milk production
Dual purpose	Both for milk production & labour



- ◆ **Breeds of Buffalo:** Buffaloes are major source of milk in our country. These are domesticated in great number. The important breeds of buffaloes with high yield of milk are:
(a) Mehsana (b) Surti (c) Murrah
- ◆ Most notable effort for dairy development & milk production in India is being carried out by NODS (National Dairy Development Board) and is called "operation flood" to increase milk production.
- ◆ It has resulted in White revolution in India.

WHITE REVOLUTION

Just like the green revolution in case of crop plants, the increase in milk production has been possible due to the launching of countrywide programme called 'operation flood' which resulted in the white revolution in India. This operation involved use of new improved high milk-yielding crossbreeds of milch animals and following the practices of animal husbandry providing them with proper feed and health care. Dr. V. Kurien is credited with the designing and implementation of the largest dairy development programme - the operation flood, and sharing in of the white revolution in India. He is known as the father of white revolution and is the founder chairman of the National Dairy, Development Board (NDDB).

FEEDING CATTLE

- ◆ Cattle food is of two types:
- ◆ **Roughage:** Rich in fibre content. It includes green fodder, silage, hay.
- ◆ **Concentrate:** Rich in all types of nutrients, lacks fibre. It includes maize, oat, barley, jowar etc.

KNOWLEDGE BOOSTER

Use of antibiotics in the feed of cattle is not permitted in Europe.

- ◆ Diseases of Cattle A healthy animal is recognized by :
 - (a) Its regular feeding,
 - (b) Normal posture,
 - (c) A definite body temperature
 - (d) Normal pulse and respiration rates.
 - A sick animal shows following symptoms.
 - (a) The animal stops eating and becomes lethargic, looks tired and remains isolated.
 - (b) The animal shivers with high body temperature.
 - (c) The animal shows excessive formation of saliva which sometimes hangs from the mouth,
 - (d) Blisters appear on skin surface, eyes turn red, and the animal may have a running nose,
 - (e) The animal passes loose dung and coloured urine.
 - (f) The lips and ears of the animal droop.
 - (g) Milk yield, egg-laying capacity or working capacity of the animal is reduced.
- ◆ **Diseases:** Diseases caused are broadly of three types:
 - Parasitic
 - Infectious
 - Non - infectious

TABLE: DISEASES OF DAIRY ANIMALS & THEIR CAUSAL ORGANISM.

S.NO.	CAUSAL	DISEASE
1	Virus	Foot and mouth disease, Pox
2	Bacteria	Anthrax
3	Fungi	Ringworm, Dermatitis



◆ **Prevention and Control:**

- Providing proper shelter.
- Ensuring animal hygiene (frequent bathing and grooming) and proper disposal of dead animals and animal wastes.
- Periodic screening of animals for diseases and immediate isolation of diseased animals.
- Providing proper diet and suitable medicines under the advice of a veterinary doctor.
- Hygienic handling of all animal products and by products,
- Compulsory vaccinations.

POULTRY FARMING

Poultry: Poultry is the collective term for domestic birds such as chicken, ducks, pheasants, geese etc. raised for their egg and meat. Rearing, breeding and caring of fowls and related birds for eggs and meat is called Poultry farming. An egg laying poultry bird is called hen and the poultry birds reared for obtaining meat are called chicken (broilers).

(A) Indigenous (desi) breeds of hen

- Aseel (Indian game)
- Ghagus (kadaknath)
- Basara (Burra)
- Chittagong (Chattisgarh)
- Brahma
- Cochin

(B) Exotic breeds used in India

- White Leghorn
- Rhode Island Red
- Black Minorca
- Plymouth
- Light Sussex

◆ **Silver Revolution:** Increase in egg production on large scale.

(C) Improvement of poultry breeds: It involves:

- Developing of new varieties. They have following advantages.
- Number & quality of chicks are increased.
- Summer adaptation capacity.
- Low maintenance requirements.
- Dwarf broilers present for commercial chick production.

(D) Poultry diseases : These birds suffer from many diseases caused by bacteria, fungi, viruses and parasites along with nutritional deficiencies.

◆ **Diseases of poultry birds:**

S.No.	Name of disease	Causative organism	Symptoms
1	Dermatitis	Virus	Irritation, blisters and eruptions on the skin surface.
2	Fowl pox	Virus	Wart like pox lesions on comb, wattles, lesions in mouth, difficulty in breathing, yellow cheese like discharges from eyes and nose.
3	Rinderpest	Virus	Constipation followed by severe diarrhoea, discharge from eyes and nostrils, loss of appetite.
4	Fowl cholera	Bacteria	Loose motions and dehydration.
5	Aspergillosis	Fungus	Patches on the skin due to growth of moulds.



- ◆ These can be prevented by proper cleaning sanitation and spraying of disinfectants.
- ◆ Poultry farming offers other advantages like:
 - (a) Investment involved is small.
 - (b) Area required is small.
 - (c) Maintenance is easy, and
 - (d) Returns are quick.

PISCICULTURE

- ◆ **Fish Farming:** Fishes have been used as protein rich diet for human beings since pre-historic period. Fishes are aquatic animals and their production is called fish farming or water agriculture.

KNOWLEDGE BOOSTER

- Term fisheries is used to include all animal resources from water (both marine and fresh water) which include fishes, crustaceans (Prawns, crabs and lobsters) and molluscs.
- Production of useful aquatic plants and animals, like fishes, prawns, crabs, lobsters, molluscs etc. by the use of various types of water sources is called **aquaculture**.
- Rearing, breeding and management of fishes on large scale under controlled condition is called. **pisciculture**.

- ◆ **Various ways to obtain fishes:-**

- ◆ **Capture fishing** - From natural resources.
- ◆ **Culture fishing** - Fish farming in land water fishes, ponds, lakes, marine fishes.
 - Our fresh water edible fish include cat fishes such as Wallago, mystus etc.
 - Indian major carps such as Catla, Rohu, Mrigal (Cirrhina).
 - Exotic varieties such as Silver carp and Grass carp.
 - Catla is the fastest growing carp of great economic significance.
 - **Marine fisheries:** India's marine fishery resources include 7500 km of coastline and the deep seas beyond it.
 - Popular marine fish varieties are pomphret, mackerel, tuna. sardines and Bombay duck.
 - Yield are increased by locating large schools of fish in the open sea using satellites and echo-sounders.
 - Some marine fish of high economic value are also farmed in seawater.
 - This includes finned fishes like mullets. bhetki, and pearl spots, shellfish such as prawns mussels and oysters as well as seaweed.
 - Marine fish culture is called mariculture.
 - **Inland fisheries** : Fresh water resources include canals, ponds, reservoirs and rivers.
 - Catlas are surface feeders.
 - Rohus feed in middle zone of the pond.
 - Mrigals and common Carps feed on the weeds.

APICULTURE

- ◆ **Definition:** Apiculture is the process of rearing of honey bees in the artificial hives, called apiaries, for the production of honey at commercial level.
- ◆ **Species of Honey bees:** Honey bees belong to phylum Arthropoda and class Insecta. There are several species of honey bees some of which are indigenous while some of them are exotic which have been introduced to increase the yield of honey.

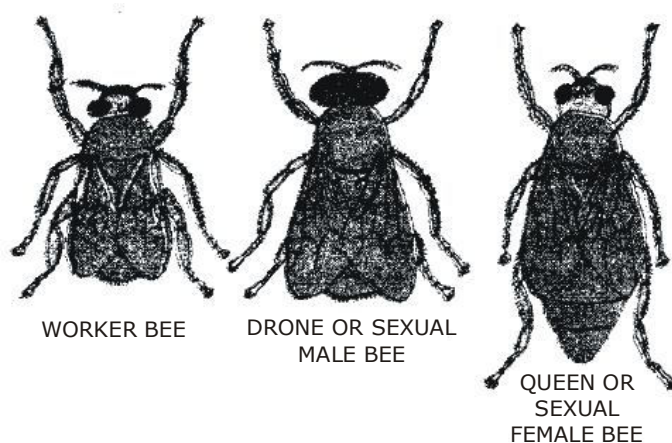


(a) Indigenous Species:

- (i) **Apis dorsata:** It is commonly called rock bee or giant bee (being largest sized). Though it produces maximum amount of honey but is ferocious and migratory bee so it is difficult to domesticate this variety.
- (ii) **Apis indica:** It is commonly called Indian bee. It can be domesticated easily as it is very gentle in nature but is less producing species.
- (iii) **Apis florae:** It is commonly called little bee (being smallest sized). It is also very docile but yield is less.

(b) Exotic Species:

- **Apis mellifera :** It is commonly called Italian bee. It is preferred over the indigenous species for the commercial production of honey because of its docile nature, high yield of honey, prolific egg production, less swarming and with good defence mechanism.
- **Honey Bee Colony and Social Organisation:** Honey bees are social and polymorphic insects. These live in large colonies, called hives or combs, of about 40,000 to 100,000 individuals. In a colony, there are three castes of bees which are structurally and functionally different from one another so polymorphism is associated with division of labour. These three castes are:
 - (i) **Queen:** Every healthy colony has only one fertile female called queen. It is the mother of the colony and has well developed ovaries. It has long tapering abdomen, short legs and wings. Its sole function is to lay the eggs at the rate of 1500 to 2000 in a day, while during its life span of about 3 years, a queen lays about 1.5 to 2.0 million eggs. A queen lays two types of eggs : fertilized and unfertilized eggs. Queen and workers develop from fertilized eggs while drones develop from unfertilized eggs.
 - (ii) **Workers:** These are largest in number (about 50,000 to 60,000) but smallest sized members. These are most active and perform variety of jobs like: attend the queen and nursery. clean the hives. form a new hive and produce wax. repair the comb, keep the comb cool, defend the members etc. So the workers have strong wings, long mouth parts. wax glands on abdomen, pollen collecting apparatus on the legs and a sting at the end of abdomen.
 - (iii) **Drones:** These are male members of the colony and are of intermediate size. These have reduced mouth parts and are sluggish Their sole function is to copulate with the queen.

**DIFFERENT CASTES OF HONEY BEES****◆ Importance of Apiculture:**

- **Products of honey bees** include honey, bees wax, bee venom and royal jelly.
- (i) **Honey:** It is produced by the workers from the collected nectar and cane sugar. It is formed of levulose, dextrose (23%), maltose (40%), enzymes and pigment (25%), minerals, vitamins and water.



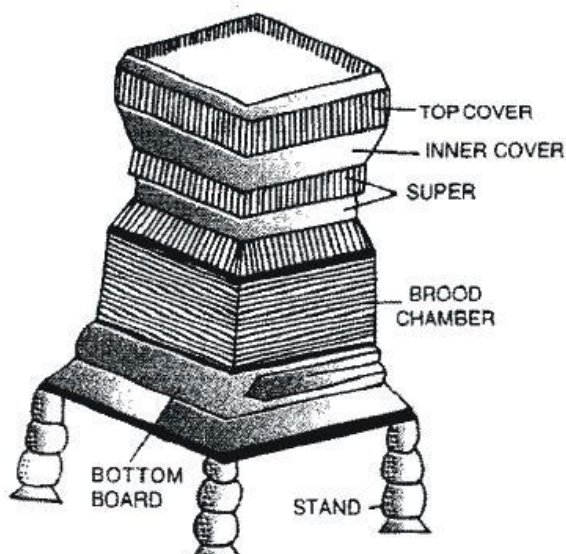
- (ii) **Bees wax:** It is used in cosmetics, paints, ointments, polishes etc.
- (iii) **Bee venom:** It is used to cure certain diseases like gout and arthritis.
- (iv) **Royal jelly :** It is used as tonic to heart patients and growing children.

Honey bees are chief cross-pollinating agents. Apiculture provides additional income generating activity to the farmers

MANAGEMENT FOR HIGH YIELDS OF HONEY

◆ **Management:** Involves all those steps which are required to be undertaken to obtain good quality and higher yield of honey from the honey bees. It involves following considerations:

- (a) **Bee Forage or Pasturage:** It includes all those flowering plants which provide pollens and nectar to the honey bees e.g. Mango, coconut, almond, tamarind, ber, berseem, litchi, cotton, shisham, apple, mahua, coriander, cashew, coffee, rubber plant, guava, sunflower, etc. Their pollens form the protein-rich food for honey bees while their nectar acts as raw material of honey. The pasturage is different from region to region and depends upon the geographical location. The quality and taste of honey depend, upon the nature of flora from which the nectar is collected. For increased yield, the pasturage should be easily available near the apiary.
- (b) **Apiary or Bee Hive:** An artificial and movable bee hive, commonly called apiary, is about 46 x 23 cm in size and is a wooden box formed of following parts :
 - (i) **Stand:** It is the base on which the whole hive is placed.
 - (ii) **Bottom Board:** It forms the base of the hive and has two apertures which act as entrance and exit for the workers and drones.
 - (iii) **Brood chamber:** It contains 5 to 10 wooden frames, each of which has a wax-sheet of the hexagonal frames, called comb foundation, on which the honey form the combs,
 - (iv) **Super:** It provides extra space for the expansion of the hive.
 - (v) **Inner cover:** It is a hole-bearing wooden cover.
 - (vi) **Top cover:** It is a plain zinc sheet for the protection of hive.



An artificial bee hive (Apiary)

- (c) **Location of Apiary:** To get maximum yield of honey, a number of bee hives should be placed in that area where abundance of bee-flora is available within 1 or 2 kms radius for honey collection.
- (d) **Honey Flow Season:** The yield of honey upon the total period for which large number of nectar and pollen-yielding plants are available in the vicinity of the apiary is called honey flow period. So honey yield will be more if the bee hives are established in an area having abundance of bee flora for longer period. While the period when no nectar and pollen is available is called dearth period.
- (e) **Swarming:** It is the process of leaving off the colony by the old queen with some workers and drones to establish a new colony at a new place and to provide the existing hive for the progeny. It normally occurs by the end of spring or early summer. But the frequent swarming decreases the yield of honey and increases the maintenance cost of the bee hives. So to get higher yield of honey, less swarming variety of honey bees (e.g. *Apis mellifera*) should be reared.
- (f) **Bee Pest and their Control:**

IMPORTANT PESTS OF BEES & THEIR CONTROL		
S.No.	Bee Pest	Control
1	Platybolium (wax beetle).	Controlled manually.
2	Polistes hebareus (yellow wasp).	
3	Componotum (black ant).	
4	Galleria mellonella (giant wax moth).	By exposing bees in bee hive to sun or to increased temerature.
5	Dicurus macrocerus (king crow).	Scared away by some device.
6	Merops orientalis (green bee eater).	

- (g) **Bee Diseases:**
- (i) **Septicemia:** A bacterial disease caused by *Bacillus aspiSepticus*.
- (ii) **Nosema disease:** A protozoan disease caused by *Nosema apis*.
- (iii) **Acarine disease:** Caused by a parasite mite *Acarapis*
- (iv) **Fungal disease:** Caused by *Aspergillus* species



SOLVED PROBLEMS

Q.1 What is Animal Husbandry ?

Sol. Animal Husbandry is the scientific management of animal livestock. It includes various aspects such as feeding, breeding and disease control.

Q.2 Why is irrigation necessary ?

Sol. Irrigation is necessary because plants take up nutrients in liquid form.

Q.3 What is fumigation ?

Sol. Fumigation is a method in which the insecticides solution is converted into fumes, i.e., vapour or gas, to kill the insects. The insecticides which are used for making fumes are called fumigants.

Q.4 Which all activities are adopted for improving crop yields ?

Sol. The activities which are adopted for improving crop yields are :

- (i) Crop variety improvement
- (ii) Crop production improvement
- (iii) Crop protection management.

Q.5 What are genetically modified crops ?

Sol. Genetically modified crops are those crops in which a gene is introduced to provide the desired characteristic.

Q.6 What determines the quality of honey?

Sol. The value or quality of honey depends upon:

- (i) The pasturage i.e., the kind of flowers available.
- (ii) Apiary location.

Q.7 What are the problems of composite fish farming ?

Sol. The problems with composite fish farming are

- (i) Many of the fish breed only during monsoon.
- (ii) Lack of availability of good quality seed.

Q.8 What is apiculture ?

Sol. The practice of bee keeping to get honey, bees wax, etc., is called apiculture.

Q.9 Why should biological control methods be preferred for protecting crops ?

Sol. Biological control methods should be preferred for protecting crops because :

- (i) They do not harm useful organisms.
- (ii) They do not cause poisoning of the stored food grains.

Q.10 What preventive and control measures should be taken before storage of grains?

Sol. The preventive and control measures that should be taken before storage of grains are :

- (i) Strict cleaning of the produce before storage.
- (ii) Proper drying of produce first in sunlight and then in shade.
- (iii) Fumigation using chemicals that can kill pests.



Q.11 What are the advantages of intercropping?

Sol. The advantages of intercropping are :

- (i) It makes better use of the natural resources of sunlight, land and water.
- (ii) It ensures maximum utilisation of the nutrients supplied.
- (iii) It also prevents pest and diseases from spreading to all the plants belonging to one crop in a field.

Q.12 What are the advantages of crop rotation ?

Sol. The advantages of crop rotation are :

- (i) It controls pests and weeds.
- (ii) It reduces the need of fertilizers.
- (iii) If crop rotation is done properly then two or three crops can be grown in a year with good harvests.

Q.13 What are pests ? How do they attack the plants or crop ?

Sol. A pest is any destructive organism which causes great economic loss by destroying crop plants or products obtained from them. Generally pests attack the plants in three ways

- (i) They cut the root, stem and leaf.
- (ii) They suck the cell sap from various parts of the plant.
- (iii) They bore into stem and fruits.

Q.14 How can pests be controlled ?

Sol. Pests can be controlled by various methods. They are :

- (i) Use of resistant varieties of crop plants.
- (ii) Timely sowing of crops.
- (iii) Clean cultivation.
- (iv) Intercropping and crop rotation.
- (v) Summer ploughing.

Q.15 What factors may be responsible for losses of grains during storage ?

Sol. Factors which are responsible for losses of grains during storage are :

Biotic : Insects, rodents, fungi, mites and bacteria.



EXERCISE – I**BOARD PROBLEMS**

- Q.1** Define – green manure and vermicompost.
- Q.2** Differentiate between bee keeping and poultry farming.
- Q.3** Give two merits and two demerits of fish culture.
- Q.4** Suggest two preventive measures for the diseases of poultry birds.
- Q.5** List out four useful traits in improved crop?
- Q.6** What is a GM crop ? name any one such crop which is grown in india ?
- Q.7** Define the term photoperiod.
- Q.8** Group the following and tabulate them as energy yielding, protein yielding oil yielding and fodder crop Peanut plant, mustard plant, Barseem, Rice plant
- Q.9** What type of crops are generally raised in green fields ?
- Q.10** Write four points on human dependence on plants and animals for food.
- Q.11** Why do we select crops which have different nutrient requirement for inter – cropping? Give two reasons.
- Q.12** The use of manure is better than the use of fertilizers. Mention any two points in support of this statements.
- Q.13** What are the factors responsible for storage of grain losses ? Give any two preventive control measures before storage of grains.
- Q.14** A farmer grows soyabeen in five rows and maize in another five rows and follows the same pattern throughout his one acre of land Name the type of cropping pattern, define the term and state two advantages.
- Q.15** Differentiate between manures and fertilisers.
- Q.16** Why micronutrients and macronutrients are called so ? What role do they play ?
- Q.17** Why should preventive measures and biological control methods be preferred for protecting crops ?
- Q.18** Genetic manipulation is considered a useful agricultural practice. Why ?
- Q.19** why are manure and fertilizers used in fields.
- Q.20** why good animal husbandry practices are considered very beneficial for the farmers.
- Q.21.** How do biotic and abiotic factors affect crop production ?
- Q.22** Compare the use of manure and fertilizers in maintaining soil fertility.
- Q.23** what are the advantages of inter-cropping and crop rotation ?
- Q.24** (a) What is composting ?
(b) How organic farming is done ?
- Q.25** What is the composition of normal animal feed
- Q.26** How do plants get nutrients ?
- Q.27** How are fish obtained ?
- Q.28** Why are manures and fertilisers used in fields ?
- Q.29** For increasing production, what is common in poultry, fisheries and bee-keeping?
- Q.30** Name two fertilisers supplying N, P, K to crops.
- Q.31** What are the factors on which irrigation requirements depend ?



EXERCISE – II**OLYMPIAD QUESTIONS**

- Q.1** DDT is :-
 (A) A non-degradable pollutant
 (B) A biodegradable pollutant
 (C) An antibiotic
 (D) Not a pollutant
- Q.2** Which amongst the following is a fungicide:-
 (A) 2-4 D (B) DDT
 (C) Bordeaux mixture (D) BHC
- Q.3** The pesticides need to be replaced because these :-
 (A) Are very costly
 (B) Cannot be stored for a long time
 (C) Are mostly toxic and non-biodegradable
 (D) Cause abnormalities in the target population
- Q.4** Heat of damp grain in storage occurs due to:-
 (A) Infestation by insects
 (B) Decrease in atmospheric pressure
 (C) Decrease in humidity
 (D) High moisture content and growth of moulds
- Q.5** Fumigants are used for :-
 (A) Preserving food materials
 (B) Killing insects harming food grains
 (C) Increasing nutrients of plants
 (D) Preserving dairy products
- Q.6** Ethylene dibromide is used as a :-
 (A) Fumigant (B) Fertilizer
 (C) Food preservative (D) Source of vitamins
- Q.7** Malathion is used as :-
 (A) Fungicide (B) Insecticide
 (C) Weedicide (D) Biocide
- Q.8** Storage grains produce aflatoxin due to growth of :-
 (A) Yeast (B) Mould
 (C) *Aspergillus* (D) Virus
- Q.9** Materials of biological origin which are commonly used to maintain and improve soil fertility are :-
 (A) Green manures (B) Biofertilizers
 (C) Bioinsecticides (D) Both (A) and (C)
- Q.10** Find out the organochlorines among the following :-
 (A) Malathion, fenitrothion, parathion
 (B) Carbofuran, propoxur, aldicarb
 (C) Phrethrin, triazines, simazine
 (D) DDT, BHC, dieldrin, endosulphan
- Q.11** Heterotrophs are organisms which :-
 (A) make their own food
 (B) derive food from animals
 (C) derive food from plants
 (D) derive food from the biomass of other organisms
- Q.12** Autotrophs are organisms which :-
 (A) make their own food
 (B) derive food from animals
 (C) derive food from plants
 (D) derive food from the biomass of other organisms
- Q.13** The increase in foodgrain production after the introduction of improved varieties of crops is often referred as :-
 (A) White Revolution (B) Green Revolution
 (C) Yellow Revolution (D) Blue Revolution
- Q.14** The minerals required by a plant in very small quantities are called :-
 (A) macronutrients (B) micronutrients
 (C) manures (D) fertilizers
- Q.15** The process of preparing manure with the help of earthworms and kitchen wastes is called :-
 (A) green manuring (B) manuring
 (C) Vermicoposting (D) farming
- Q.16** Growing two or more crops at the same time in a field is called :-
 (A) mixed farming (B) mixed cropping
 (C) farming (D) intercropping



- Q.17** The practice of growing two or more crops simultaneously in definite rows in the same field is called :-
 (A) mixed cropping (B) mixed farming
 (C) intercropping (D) farming
- Q.18** A pulse crop is grown in the time interval between two cereal crops to compensate for the :-
 (A) loss of phosphate (B) loss of water
 (C) loss of sulphur (D) loss of nitrogen
- Q.19** The science of improving crop varieties is called :-
 (A) hybridization (B) selection
 (C) plant breeding (D) introduction
- Q.20** Plant breeding aims to produce :-
 (A) disease-free varieties
 (B) high-yielding varieties
 (C) early-maturing varieties
 (D) all the above
- Q.21** Increase in oil production is :-
 (A) Golden revolution (B) Yellow revolution
 (C) White revolution (D) Blue revolution
- Q.22** Pulses are rich in :-
 (A) Proteins (B) Carbohydrates
 (C) Oils (D) Vitamins and minerals
- Q.23** Kharif crop is :-
 (A) Summer season crop
 (B) Winter season crop
 (C) Spring season crop
 (D) Autumn season crop
- Q.24** Rabi crops are sown in
 (A) August (B) September
 (C) October (D) March
- Q.25** The method used to obtain variety with high yield and other desirable characters is :-
 (A) Introduction (B) Selection
 (C) Hybridisation (D) Both A and B
- Q.26** *Pusa lerma* is an improved variety of :-
 (A) Rice (B) Maize
 (C) Soya bean (D) Wheat
- Q.27** Which one is a micronutrient :-
 (A) Iron (B) Calcium
 (C) Magnesium (D) Potassium
- Q.28** The common biofertilizers used in organic farming are :-
 (A) Margosa
 (B) Pyrethrum
 (C) Green manure
 (D) Nitrogen fixing bacteria and cyanobacteria
- Q.29** Cultivation of two or more crops together in the same field is :-
 (A) Mixed cropping (B) Intercropping
 (C) Crop rotation (D) All the above
- Q.30** Growing different crops in the same field in a preplanned succession is :-
 (A) Crop management (B) Crop rotation
 (C) Intercropping (D) Plant breeding

Answers

- | | | | | | | | |
|------------|---|------------|---|------------|---|------------|---|
| 1. | A | 2. | C | 3. | C | 4. | D |
| 5. | B | 6. | A | 7. | B | 8. | C |
| 9. | D | 10. | D | 11. | D | 12. | A |
| 13. | B | 14. | D | 15. | C | 16. | B |
| 17. | C | 18. | D | 19. | C | 20. | D |
| 21. | B | 22. | A | 23. | A | 24. | C |
| 25. | C | 26. | D | 27. | A | 28. | D |
| 29. | A | 30. | B | | | | |



FOR SCHOOL EXAM. QUESTIONS**EXERCISE-I**

1. What nutrients mainly we get from vegetables, spices and fruit crops?
2. What is hybridisation?
3. What are manures?
4. What is composting?
5. Write one main aim of mixed cropping.
6. Name the process by which two different crops are sown alternately in the same field.
7. What does cattle feed include?
8. Which vitamins are kept at high level in the poultry feed?
9. Name major indigenous breeds of fish which are cultivable.
10. Write two advantages of bee-keeping.
11. Define aquaculture.
12. What is induced breeding ?

EXERCISE-II

1. What is composite fish culture? Write the advantages of composite fish culture?
2. What is poultry farming? Name two Indigenous and exotic poultry breeds.
3. Discuss the various measures for safe storage of grains.
4. Enlist various methods of weed control.
5. Name various species of bees which one of them is most useful and why?

EXERCISE-III**SECTION-A**• **Fill in the blanks**

1. Raising domestic fowl for chicken, meat and egg is _____
2. Worms are _____ parasites.
3. _____ animal used for tilling and carting.
4. Before storage _____ is done to remove insects.
5. Period of milk production after birth of calf is _____ period.
6. _____ adds humus to soil.
7. _____ is growth and flowering in plants with respect to duration of sunlight.
8. _____ increase water holding capacity of soil.
9. Culturing of aquatic plants and animals is called _____.
10. _____ Molluscan animals can produce pearls.

SECTION-B• **Multiple choice question with one correct answers**

1. Organisms preparing own food are
(A) Photoautotrophs (B) Chemoautotrophs (C) Both (D) Heterotrophs
2. Abiotic factors includes
(A) Drought (B) Salinity (C) Temperature (D) All
3. Most important source of nutrient for plants is
(A) Soil (B) Water (C) Air (D) None



4. Manure is prepared by
(A) Microbial decomposition (B) Chemical treatment
(C) Physical processing (D) All
5. During inter-cropping, nutrient requirement of plants must be
(A) Different (B) Same (C) Uncertain (D) All
6. Long locotation period is found in
(A) Jersey (B) Red Sindhi (C) Sahiwal (D) All
7. Which is not technique of crop improvement
(A) Introduction (B) Selection (C) Hybridization (D) Feeding
8. Broiler chicken are given
(A) More protein (B) No protein (C) Less protein (D) None
9. The production and management of fish is
(A) Sculpture (B) Apiculture (C) Aquaculture (D) Both (B) and (C)
10. Process of cross-breeding two individuals of different variety is
(A) Hybridisation (B) Feeding (C) Intermixing (D) None
11. Cattle feed includes
(A) Roughage (B) Concentrates (C) Both (D) None
12. Worms are
(A) External parasite (B) Internal parasite (C) Freindly (D) None
13. Leghorn is
(A) Exotic breed (B) Indeginous breed (C) Both (D) None
14. Crops grown in winter are
(A) Kharif (B) Rabi (C) Both (D) None

SECTION-C

• Assertion & Reason

Instructions: In the following questions as Assertion (A) is given followed by a Reason (R). Mark your responses from the following options.

- (A) Both Assertion and Reason are true and Reason is the correct explanation of 'Assertion'
 (B) Both Assertion and Reason are true and Reason is not the correct explanation of 'Assertion'
 (C) Assertion is true but Reason is false
 (D) Assertion is false but Reason is true

1. **Assertion:** It is not good idea to rely on rainfall as source of irrigation
Reason: Timing of monsoon season is highly fluctuating,
2. **Assertion:** All living organisms requires food.
Reason: Plant can synthesize there own food.

SECTION-D

• Match the following (one to one)

Column-I and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. Only One entries of column-I may have the matching with the same entries of column-II and one entry of column-II Only one matching with entries of column-I

- | | |
|---|---|
| 1. Column I
(A) Rearing honeybee
(B) Manure
(C) Culturing fish
(D) Weeds | Column II
(P) Pisciculture
(Q) Add humus
(R) Unwanted plant
(S) Apiculture |
|---|---|



EXERCISE-IV

SECTION-A

• Multiple choice question with one correct answers

- Which of following is milch animal?
(A) Apis spp. (B) Bos indicus (C) Bos bubalis (D) Both (B)&(C)
- Bees are kept for
(A) Honey (B) Wax (C) Medicine (D) All
- Vermicompost is
(A) Manure (B) Excreta of earthworm
(C) Both (A) & (B) (D) None
- BGA is
(A) Pesticide (B) Biofertilizer (C) Both (D) None
- Fertilizers
(A) Add humus (B) Do not add humus (C) Uncertain (D) None
- Type of irrigation method.
(A) Tilling (B) Sprinkle (C) Drip (D) Both (B)&(C)
- Example of Green manure is
(A) Neem (B) Legumes (C) Both (D) None
- Source of protein
(A) Oat (B) Sudan (C) Soyabean (D) All
- Wheat is
(A) Rabi crop (B) Kharif crop (C) Both (D) None
- To prevent lodging crop should be
(A) Tall (B) Dwarf
(C) No relation in night and lodging (D) All of the above

SECTION-B

• Multiple choice question with one or more than one correct answers

- Livestock includes
(A) Goat (B) Cattle (C) Wild animal (D) Poultry
- Weeds includes
(A) Parthenium (B) Xanthium (C) Wheat (D) Rice
- Crop rotation
(A) Ensure proper utilization of nutrients (B) Keeps pest and disease low
(C) Reduce soil fertility (D) Waste time
- Problems with composite fish culture
(A) Breeding only in monsoon season (B) competition among fish varieties
(C) Lack of good quality fish seed (D) All
- Factors considered for storage of grain
(A) Temperature (B) Moisture (C) Fungus (D) Insects

SECTION-C

• Comprehension

Apiculture is done for producing honey, wax and medicine. The varieties used for apiculture includes A. dorsata, A. florae etc because they sting less and live longer in given beehive.

- Rearing of bee is done for



2. (A) Honey (B) Wax (C) Furfural (D) Both (A) & (B)
Honey bee are kept in
3. (A) Cage (B) Cave (C) Beehive (D) All
Useful honey bee is/are
- (A) A. Florae (B) A. dorsata (C) Both (D) None

SECTION-D

- Match the following (one to many)

Column-I and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. One or more than one entries of column-I may have the matching with the same entries of column-II and one entry of column-II may have one or more than one matching with entries of column-I

1. **Column I** **Column II**
- (A) Poultry (P) Manure
- (B) Livestock (Q) Broiler & Layer
- (C) Organic (R) Produce egg & meat
- (D) Biodegradable (S) Cattle

Answers

EXERCISE-III

SECTION-A

1. Poultry farming 2. Internal 3. Drought
4. Fumigation 5. lactation 6. Manure
7. Photoperiodism 8. Manure 9. Aqua culture
10. Bivalve

SECTION-B

1. (C) 2. (D) 3. (A) 4. (A) 5. (A) 6. (A)
7. (D) 8. (A) 9. (C) 10. (A) 11. (C) 12. (B)
13. (A) 14. (A)

SECTION-C

1. (A) 2. (B)

SECTION-D

1. (A)-(S), (B)-(Q), (C)-(P), (D)-(R)

EXERCISE-IV

SECTION-A

1. (D) 2. (D) 3. (C) 4. (B) 5. (B) 6. (D)
7. (B) 8. (C) 9. (A) 10. (B)

SECTION-B

1. (A,B,D) 2. (A,B) 3. (A,B) 4. (A,C) 5. (A,B,C,D)

SECTION-C

1. (D) 2. (C) 3. (C)

SECTION-D

1. (A)-(Q,R), (B)-(R,S), (C)-(P), (D)-(P)

